

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

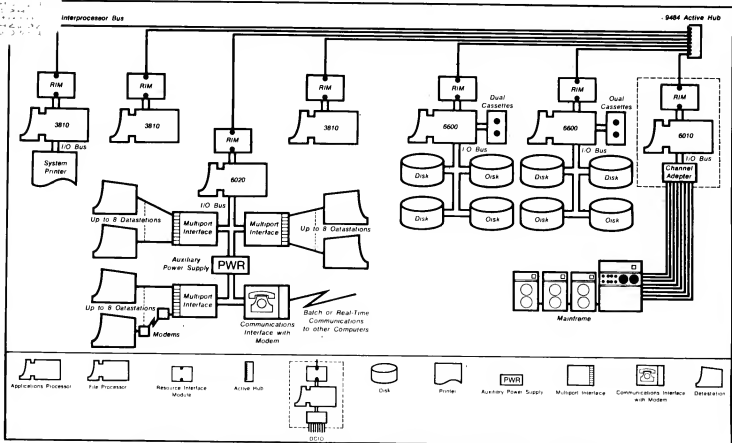
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Datapoint Concept Links Dedicated Processors



One configuration of the ARC system includes an interface to an IBM 360/370 mainframe.

By Esther Surden
CW Staff

NEW YORK — Datapoint Corp. last week unveiled a concept that reportedly permits users to configure several functionally dedicated processors along a common bus so all processors act as a single system and have access to a common data base.

The Attached Resource Computer

(ARC) system concept links the functional processors to a coaxial bus with certain processors dedicated to file and data base maintenance while others serve as application processors.

Datapoint calls the concept "attached processing."

Users with Datapoint equipment already in place can implement an ARC system by adding specialized

software as well as an interprocessor bus of high-speed coaxial cable. Resource Interface Modules (RIMs) and Active or Passive Hubs link the RIMs, a spokesman explained.

Three System Elements

An ARC system includes three basic elements: processors dedicated to applications, processors dedicated to handling files and the interprocessor coaxial bus, which transfers data at a rate of 2.5 million bit/sec.

The applications processors run user-defined applications, either in batch or transaction processing mode. An applications processor may have either a single user or multiple users, depending on the processor chosen.

Any of the processors in the Datapoint line can be used as applications processors, as can IBM mainframes, the spokesman noted. However, IBM CPUs can be hooked into the system only through use of a Direct Channel Interface Option (DCIO).

The DCIO attaches to the byte multiplexer channel on IBM 360/370 equipment and the mainframe can run jobs in Basic, Cobol, RPG, Fortran, PL/I and other languages and access the system's common data base.

Program results from the IBM system

are then stored in the ARC data base for use by other applications processors on the system. Datapoint said, adding the entire ARC system would look like extremely fast unit record equipment to the IBM computers.

Datapoint 6000/5500 minicomputers can be used as the file processors in the system, and they manage the mass

(Continued on Page 6)

NCR Caps 8000 With Two CPUs, Its Biggest Yet

By Jeffrey Beeler

CW Staff

DAYTON, Ohio — NCR Corp. last week rounded out its 8000 processor series with the announcement of what the company said are the two most powerful computer systems it has introduced.

The Model V-8580 provides 33% more processing power than the V-8570, formerly the largest member of the 8000 line, and 20% more performance than IBM's 370/148, the NCR system's main competitor, the firm

(Continued on Page 4)

Federal Laws Forcing Rise In Employee Record Costs

By Ann Dooley
CW Staff

MONTVALE, N.J. — Automated personnel recordkeeping — exclusive of payroll files — is costing the nation's businesses an estimated \$75 per employee or \$1.3 billion per year, according to a report released here recently by Information Sciences, Inc. (INSci).

These personnel recordkeeping expenses, which now represent a median of 5% of corporate DP budgets, are largely the result of increasing government regulations and will increase further as companies continue to upgrade to on-line, data base manage-

ment and remote-batch terminal systems, the report said.

The survey results were drawn from more than 600 human resource and corporate executives from 300 major U.S. companies at a recent human resource systems conference sponsored by INSci.

More than 38% of the survey respondents estimated that the size and cost of their organizations' recordkeeping functions had doubled as a result of compliance with federal regulations and nearly 57% answered that their costs had at least tripled.

(Continued on Page 5)

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Typetting Supervisor: Denise Lundell

Please address all correspondence to the appropriate department at 797 Washington St., Newton, Mass. 02160. Phone: (617) 965-5600.

TELEPHONE: 212-2529

OTHER EDITORIAL OFFICES: England: Computerworld Publishing Ltd., 2 Bath Road, London W11N. Phone: (01) 995-3352. Telex: 934287. W. Germany: Computerworld, c/o Computertechnik GmbH, 8000 München 40, Frisingenstr. 11. Phone: 36-40/36-37. Telex: 5213350. Asia: Computerworld, c/o Dempa/Computerworld Company, Dempa Building, 1-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6302. Telex: J2424461.

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Internal IBM Memo Points to Katzenbach As Director of Document Laundering Plan

By Catherine Arnst

CW Staff
NEW YORK—IBM's general counsel—a former U.S. Attorney General—apparently directed a company project in which top officials "laundered" the language used in company documents to avoid references to actions that might violate antitrust laws.

According to recently released documents in the U.S. vs. IBM antitrust case here, Nicholas deB. Katzenbach, Attorney General in the Johnson Administration, instructed top corporate officials of the Management Review Committee (MRC) on "terms to be avoided and terms to be used to maintain consistency" at a Saturday meeting of the group on May 31, 1969, just four months after the government filed suit against the firm.

The document—one of several thousand IBM has been fighting to keep out of the public record in the case—deals specifically with IBM's planned unbundling announcement, which followed the MRC meeting by a month.

For example, the officials at the meeting were instructed to answer "why unbundled?" questions by emphasizing that the decision was made "before filing of suits," but that IBM "moved up its timetable and broadened its action in response to [the Department of Justice] filing."

The executives were also instructed to answer that the firm "continues to believe its pricing practices were legally correct; that [the government] position and that of other claimants is somewhat premature as it relates to separate pricing," according to charts prepared for presentation at the session.

That MRC document—written by Hilary Faw, assistant treasurer for the firm—was also used by the government to lay foundation for an undated and unsigned document that it entered into evidence in June of last year.

The one-page memo—entitled "Buln Task Force," which was the IBM task force set up to study unbundling approaches—also warned executives to watch their language.

"There are several legal defenses which could be adversely affected if executives are not careful in choosing the right words when publicly discussing" the unbundling issue, that document said.

"We should not admit any legal liability to our users to supply support services to them without charge," the document continued. To avoid such admissions, words like "commitment to our customers," "obligation" and "liability" were to be avoided.

"Instead, we should use the phrase, 'During the transition period, customers will receive systems engineer assistance without charge to the extent such services had been mutually planned by IBM and the user,'" the memo said.

The memo acknowledged that there are some arguments that can be made that our traditional way of providing programs services without charge was not an illegal tie and that words "which appear to admit a tie should be avoided." Such words were "tie," "bundle," "unbundle," "separate price" and "formerly offered for a single price."

"Instead we should say 'services previously furnished without charge' will now be offered for a charge."

The firm should also avoid the phrase "programs available to users of IBM CPUs" because it was inconsistent with IBM's defense that IBM computer programs belong to the public domain, the document said.

IBM defense attorney Ronald Wolf objected to the government's attempt to tie these two documents together, claiming there was no foundation for such a connection.

Correction

In "His Restructures Level 68 Line" (CW, Nov. 21), it was incorrectly stated that Geos software is provided with the hardware. Instead, Multics software is provided and all other software is separately priced. In addition, the Model 68/80 cannot be field upgraded to the 68/DPS system.

Price Hikes Hit Xerox Users

WALTHAM, Mass.—Honeywell Information Systems, Inc. has hiked prices across the board for systems and services provided for its Xerox computer system user base.

"Price increases were effective Dec. 1 for 'new' business and will take effect March 1 for existing contracts."

Purchase prices for selected Xerox computer systems will be raised 10%; lease charges for most Xerox computer systems will be increased 2.5%. Xerox computer maintenance and field expansion charges will be hiked 5% to 7%, HHS said.

Purchase prices will be boosted 10% on Sigma 9 and 9/3 computer systems. The 2.5% jump in monthly lease rates affects all Xerox Sigma 2, 3, 5, 6, 6E, 7, 8, 9, 9/2 and 9/3 CPUs, features and options; all Xerox Sigma 550 and 560 CPUs, features and options; all 9 series

XDS 925, 930, 9300 and 940 CPUs, features and options; all Xerox peripherals and options; and all systems analog instruments and computer systems products, according to a spokesman.

Monthly maintenance and field expansion charges will increase by 5% for all Sigma 5, 6, 6E, 7, 8, 9, 9/2 and 9/3 CPUs, features and options and for all Xerox Sigma 550 and 560 CPUs, features and options.

Monthly maintenance and field expansion charges will increase by 7% for all Sigma 2 and 3 CPUs, features and options; all Xerox Sigma 550, 560 CPUs, features and options; all 9 series XDS 925, 930, 9300 and 940 CPUs, features and options; all Xerox peripherals and options; and for all systems analog instruments and computer systems products.

On the Inside This Week

NEWS

Delunet Supermarket Sues Univac for Fraud	4
Bell Bid for Antitrust Immunity Killed	5
GAO Faults IRS for Poor System Safeguards	7
Responsatives File for FCC Attention	6
Register to Link People and Jobs	6
Federal Encryption System Hit as Vulnerable	11
Top Firms Lack Information Policy	13
Information Resource Manager Seen Coming	15
Golfers' Swings Prove Aid	16
GM Sees DP Directing 90% of Manufacturing	17

EDITORIAL

Editorial: Stalling Tactics	22
Human Connection: Does NSA Violate Rights?	22
Taylor Report: DP Liability Complex	23
Reting System Must Fit CPU and I/O Units	27

SOURCE & SERVICES

Package Eases Move to IBM Machine	29
DBMS on Infonet Works for Novice Users	32
'Edition 6' Adds Ecdip Support	36

COMMUNICATIONS

Processor Eases User's Net Expansion	37
Trendata Has Flexible Disk Unit	40

TERMINAL TRANSACTIONS

EFT Tests Start on Bankwire II	39
--------------------------------	----

Tektronix Offers CRT Camera	39
-----------------------------	----

SYSTEMS & PERIPHERALS

Be Specific, Guide to Contracts Advises	41
---	----

Graphics Processor Debuts	46
---------------------------	----

MINI/MULTI

Auerbach: 16-Bit Ene Not Over	47
-------------------------------	----

Mini, Microfilm Simplify Court File System	52
--	----

DEC Has Lab Peripheral Controllers for PDP-11	53
---	----

MICROCOMPUTING

Are You Covered?	55
------------------	----

Monolithic Board Works With Intel 80C-60	57
--	----

Cassette Operating System Offered	58
-----------------------------------	----

COMPUTER INDUSTRY

Vendors Seldom Alone at Client Site	61
-------------------------------------	----

IBM Settlement Aimed to Avoid 'Glitch' Image	61
--	----

Benkrupp Key-to-Disk Meker CGI Rebounds	62
---	----

Diebold Printer Terminal Added to IBM 2741 Mart	64
---	----

Educated User Seen Factor in Distribution Push	65
--	----

Datapoint Expects Arc to Open New Markets	68
---	----

IBM Considered Blind Study on Leasing in '88	67
--	----

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1977

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WHITLOW

COMPUTER SYSTEMS Inc. 560 Sylvan Ave., Englewood Cliffs, N.J. 07632

SCENE: One of those prestigious industry seminars that took place just a few years ago. The very cream of the data-processing world was in attendance. All the women were brilliant and all the men were handsome.

During a pause for refreshment, an affable hardware executive stopped to exchange a few words with Our Man on the Scene.

"SyncSort?" he said. "Sorting program, isn't it? Well, lots of luck. But you'll have to remember that sorting has traditionally been the hardware manufacturer's turf."

Our man didn't say a word. He just favored the hardware merchant with a cheshire-cat smile and thought to himself: Wait, friend, wait!

We're happy to announce that the wait is now over. On December 1, the sorting turf changed hands. SyncSort became the most widely used OS and OS/VS sort in the U.S., with 1,614 tough-minded, clear-eyed users — or half the total. (To whom, incidentally, we send our warmest holiday greetings!)

The tables below will give you a somewhat clearer picture of IBM's Decline and Fall as a Sorting Power. The figures on the left show the results of a telephone survey of OS and OS/VS users in America conducted for us last July by the International Data Corporation. (We'll be glad to send you a copy if you'll call.)

The figures on the right are an updated projection to December 1, made by our beloved House Statistician, a fussy old character in a green eye shade, formerly employed by Scrooge & Marley.

OS & OS/VS Sort Users — U.S. Only

	July 1, 1977		December 1, 1977	
	#	%	#	%
SyncSort	1333	43	1614	50
5740-SM1	992	32	880	28
5734-SM1	465	15	395	12
SM023	186	6	182	6
Others	124	4	129	4
	3100		3200	

As the math majors among you will have concluded, IBM's three sorts — one of which is a "freebie" — now have only 46% of a market that once belonged to them lock, stock and barrel. A very bad case of erosion, as our dentist would say.

And as for the other sorts, well, they're still holding on to their share of the market with what's left of the old fingernails.

There are probably a number of reasons for SyncSort's accelerating success in 1977. But if you had to isolate the three most important, you'd have to say performance, performance and performance. If a sort program doesn't save your computer resources and make your life a little more pleasant, what does it do? Boil eggs?

Defunct Supermarket Sues Univac for Fraud

By Molly Updon

CW Staff

SAN FRANCISCO — Does use of a computer system constitute use acceptance? That's a large issue in the \$525,000 suit alleging fraud that has been brought against Univac by Store to Door Supermarkets, Inc. and is scheduled for trial Feb. 27.

Store-to-Door (STD) was in business less than three months and, within four days of opening in 1972, was forced to switch to next-day delivery of groceries instead of same-day service because of problems in connection with the Univac 9400 computer system, the complaint alleged.

At a recent hearing in federal district court here, Judge William H. Orrick Jr. left standing the substance of STD's charges of fraud and misrepresentation after striking some of the counts, according to STD attorney Charles D. Chalmers of Weld, Freeland and Chalmers.

STD voluntarily withdrew its claims for implied warranty, Chalmers said. Univac declined to comment on the case.

The suit seeks \$525,000 in losses as well as interest and penalty. It is not a straight contract case, but charges Univac with fraud and misrepresentation in several counts and says its statements that the 9400 was a proven and reliable computer and that Univac would assign experienced personnel to

create software for STD.

The STD suit charges that "programmers at Univac on the STD project received training in Cobol, used on the STD system, while working on the project."

In addition, "no one at Univac on the STD project team had ever worked on a 9400 real-time communications system before," SDC charged.

STD was founded on the premise that it could offer consumers delivery of groceries on the same day they called in the order.

As the opening date drew near, Univac had not completed system pre-

testing, according to the complaint. Because the firm wanted to open on Sept. 7, the Univac project leader told the firm to begin operations with the computer, saying it would function properly, STD said.

Univac told STD it would complete its acceptance testing later, the complaint stated.

However, by Nov. 4, when the firm closed, Univac had not demonstrated the system satisfactorily, STD stated.

STD also charges that Univac's failure to notify the firm of problems that were likely to result in delays was fraudulent and oppressive.

Univac, in its brief, pointed out that an amendment to the software contract included a "use constitutes acceptance" provision.

"If Store-to-Door desires to utilize the computer system and software for commercial and/or retail operations before formal acceptance is complete, Store-to-Door agrees that the computer system and software are accepted," the contract stated.

"Univac Phase I liabilities will be satisfied when order-taking operations utilizing the computer system commence."

Two CPUs Top Off NCR 8000 Line

(Continued from Page 1)

claimed. The Model V-8590, meanwhile, offers twice the processing power of the V-8580 and performance comparable to that of its principal rival, the IBM 3031, NCR said.

The debut of the two latest additions to the 8000 family, which this year has grown from two to 15 models, coincided with NCR's introduction of an increased-capacity disk unit and a magnetic tape drive.

In announcing the two top-of-the-line computer systems, NCR predicted that next year it would introduce a still larger CPU family dubbed the V-8600, a "large-scale multiprocessor" line the company said would mark its "first of entries in the very large systems field."

Quoting his firm's technical expert, NCR's new services manager, Bob Skovgard, attributed the two computer systems' increased processing power to modified processor and memory designs. Improved processor features include a "hardware assist unit" that executes in hardware commands that otherwise would be executed in firmware, Skovgard said.

With the V-8570 and other members of the 8000 line, execution of a command involves two firmware calcula-

tions or subroutines — one to locate the needed address and the other to access the address. In the hardware assist unit, however, index registers replace the firmware subroutines, he explained.

The unit thus circumvents the locating and accessing steps and speeds processing, he said.

Both the V-8580 and V-8590 incorporate a hardware assist unit. The V-8590 also comes with dual processor — a fact that explains why the V-8590's computing power exceeds the V-8580's, Skovgard said.

Both of the V-8590's processors share all system resources, the company added.

Memory enhancements incorporated in the two systems include the use of both 16K-bit technology and four-way interleaving, a design technique that "allows several processing subsystems to access memory at the same time," NCR stated.

The V-8580 and V-8590 mark the first application of these two memory features in NCR's product designs, Skovgard said. All earlier members of the 8000 family had incorporated 4K-bit technology and two-way interleaving.

Typical Applications

The processor and memory enhancements enable the V-8580 and V-8590 to perform jobs that would have outstripped the processing power of NCR's previous systems, he firm said. Typical applications for the two systems include standard business functions like general ledger and accounts receivable, Skovgard stated.

Both systems operate under NCR's Virtual Resource Executive and come with an "extensive" library of application programs for manufacturers, financial institutions, retail firms, wholesale distributors, educational institutions, government offices and health-care organizations. The two systems accommodate programs written in Cobol 74, Next VS, Fortran, RPG, Cobol 68, Next/3 and NCR Century languages, according to the firm.

Users of earlier 8500 series processors can upgrade to a V-8580 by attaching a hardware assist unit, replacing their power supplies, installing a faster and denser instruction storage memory board, replacing their 64K memory boards with 256K memory boards, adding a second memory plenum, obtaining an added memory interface and attaching extra card slots, Skovgard said.

Both computer systems access

memory in 475 nsec, operate with a processor cycle time of 56 nsec and provide up to eight trunks, NCR spokesmen noted.

In addition to its other features, the V-8590 offers a modified input/output method in which an I/O link protocol transfers data serially at 2 million byte/sec, the firm added. In some instances this improved I/O method yields cost savings of up to 50%, Skovgard claimed.

To implement the I/O technique, NCR has equipped the V-8590 with up to six I/O link controllers, each of which attaches to the processor's internal transfer bus and accommodates up to four I/O links, the company said.

Peripheral Additions

NCR's latest peripheral additions, the 6540 disk storage subsystem and the 6370 magnetic tape storage unit, also use the I/O link protocol, as do the 6370 and 6540. The 6540 Model 658 disk unit and the Model 647 printer line, according to the spokesmen.

The 6540 subsystem transfers data at 1.2 million byte/sec, accesses in 38.3 msec and, with a capacity of 540M bytes, stores about three times more data than what was previously NCR's largest disk unit, Skovgard said. Each of the subsystem's four nonremovable disks provides five recording surfaces for a total of 20, he added.

The 6370, meanwhile, uses the Group Code Recording mode to store 6,250 bit/in. and transfer data at up to 1.2 million byte/sec, NCR said.

Deliveries of the disk storage subsystem and the magnetic tape unit will begin in the latter half of next year, as will the first shipments of the V-8590. Deliveries of the V-8580 are scheduled to start in the third quarter of 1978.

Purchase prices for the 6370 tape unit begin at \$24,100, with monthly rentals starting at \$640. Prices for the 6540 disk subsystem are not yet available, Skovgard said.

A V-8580 processor with a minimum 1M-byte memory and three I/O trunks costs \$517,600 or leases for \$11,385/mo under a five-year contract. It expands to 4M bytes in 1M-byte increments that sell for \$110,000 or rent for \$3,303/mo under a five-year contract.

A V-8590 with a minimum 2M-byte memory costs \$720,000 or leases for \$18,610/mo under a five-year contract, and it expands in 1M-byte increments to as much as 6M bytes, according to the company.

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High Court Kills Bell Bid For Antitrust Immunity

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — AT&T's bid for immunity from antitrust prosecution because of its regulated status has been rejected by the U.S. Supreme Court.

The court's decision means that the 1974 suit launched against AT&T and the Bell System by the Justice Department will come to trial. Discovery proceedings in preparation for the trial phase of the suit had been suspended pending the Supreme Court review on the jurisdictional aspect.

AT&T had claimed that being subject to regulatory control by the Federal Communications Commission and state regulatory commissions gave it immunity from antitrust prosecution. AT&T earlier had attempted to go directly to the high court with its appeal after a U.S. District Court had ruled against it. However, the Supreme Court ruled that the lower court ruling first had to go through the appeals process.

In effect, the Supreme Court ruling upheld the findings of both lower

courts that Bell would have to defend itself against the Justice Department's charges.

The government suit seeks to force AT&T to divest itself of its Western Electric manufacturing facility and its Long Lines division, which handles long-distance calls.

In its claims before the courts, AT&T had said the suit would cost about \$1 billion, more than any other case in antitrust history, and it contended that the public should be spared the burden of shouldering this cost.

After the Supreme Court ruling, AT&T chairman John D. DeButts said the phone company was disappointed at the court's findings.

Another Setback for Ma Bell

By Ronald A. Frank
CW Staff

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has denied a request from the telephone industry to stay implementation of the FCC's registration program for telephone equipment.

At issue was a request to hold up the registration program that would allow using customer-provided equipment as the first or primary instrument at a user location.

The commission, in rejecting the request, said it was planning to initiate a proceeding within the next few weeks to examine the benefits of the AT&T-fostered proposal covering primary instruments.

Under AT&T's primary instrument concept, the first phone at a customer location would have to be provided by a phone company, with the user free to install other noncarrier units after that.

In the meantime, issuance of a stay would be contrary to the findings of the 1968 Carterfone ruling, which gave customers the right to connect noncarrier equipment to the phone network, the commission said.

The FCC certification program will substitute standard plugs and jacks for the connecting arrangements formerly required. The program will apply to all data equipment that has passed FCC type acceptance procedures for registration and certification.

Laws Boosting Record Costs

(Continued from Page 1)

Regulations implementing Equal Employment Opportunity (EEO), the Occupational Safety and Health Act (Osha) and the Employee Retirement Income Security Act (Erisa) will account for more than 50% of 1978 personnel budget, costs and potential liabilities. These costs will rise significantly according to the size of the company's spending and the extent of its potential liabilities, InSci said.

For most companies, Erisa will prove the most costly and EEO will be responsible for the largest liability potential, the report added.

EEO's Impact

Currently, EEO has the greatest impact on employers, according to 40% of the survey respondents. EEO legislation will also be most subject to extension and reinterpretation and thus prove most costly within the next five years, 27% of the employers reported.

In addition, the cost of running and maintaining personnel files has nearly doubled since the introduction of Erisa in the early '70s. It will double again by 1980 as a result of the spreading coverage and recurring reinterpretation of Osha, InSci estimated.

Survey respondents also felt they will soon be strongly affected by a fourth area of compliance: privacy. Although no one knows how extensive such regulations will prove to be, nearly 60% said they believe their organizations will first feel the full impact of the privacy issue by 1979 or 1980.

In addition to budget costs, median estimates show that personnel matters take up to one-fifth of top management's time. These matters may take up to 30% within five years, and many respondents believe they will eventually take up more than 50% of top management's time, InSci reported.

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Datapoint Adds Machines Along With ARC Concept

(Continued from Page 1)

storage devices. Each file processor handles up to 200M bytes of disk storage.

A RIM box is attached to the I/O bus of each file and application processor. These special-purpose interfaces provide a unique identification for their associated processor and receive messages addressed only to that processor, the company said.

RIMs are linked to each other or can be attached to a Passive Hub — a device to physically link the RIMs.

If more than five RIMs — and therefore processors — are on the system, then an Active Hub must be used to amplify the signals. The Active Hub can link up to eight RIMs or eight other Active Hubs.

With the addition of a Hub Expander Card, up to 16 RIMs or Active Hubs

can be linked into one system — giving the system a theoretical maximum capacity of 256 linked processors.

Cable lengths between an Active Hub and a RIM or another Active Hub can be as long as 2,000 feet. Up to 10 Active Hubs can be attached in tandem to the same cable, Datapoint said.

Like Packet Switcher

Firmware within the RIM boxes permits the system to act as if it were a "packet-switching" network, Datapoint said. When a processor opens a file, a pseudo-channel is established between that processor and the disk processing subsystem, with data broken up into fixed-sized packets for transmission along the coaxial bus.

The system uses Datapoint's standard disk operating system, which has been modified with special handlers to allow it to "see" the RIM boxes.

The RIM boxes look as much like a disk controller to the operating system as we could make them," the spokesman said.

Two versions of ARC software — one for file processors and one for applications processors — must be loaded into present 5500 or 6600 systems to convert them to ARC configurations. The ARC software is distributed on cassette.

All operations of the DCIO, RIMs and hubs are transparent to the user, the spokesman said. Processors can be added, moved or deleted from a system at will; disk files can be split among two or more processors to increase sys-

Tax Suit Gets Boot

NASHVILLE, Tenn. — A suit against the State of Tennessee seeking to have the state legislature's tax statute on software declared invalid has been dismissed from the U.S. District Court for the Middle District of Tennessee.

Judge L. Clure Morton indicated his court does not have jurisdiction over the suit filed by Robert M. Sherin, because adequate remedies can be sought through the courts of the state of Tennessee. The proper way to fight taxation in this case is to await an assessment, pay it and then file a suit for a refund, Morton stated.

Sherin, president of Nova Computing Services, Inc. of Florida, brought the suit after the legislature declared software tangible and thus taxable after the state Supreme Court had ruled that it was intangible in the case of Commerce Union Bank vs. Tidwell [CW, Aug. 30, 1976].

Sherin indicated he has filed an appeal.

The state had sought to have the suit dismissed on grounds that the court lacked jurisdiction and that Sherin lacked standing to bring such an action.

tem throughput at any time, the firm added.

When processors are added to the system, the joining processor causes a disturbance and attracts the attention of the polling process, which then records that processor. If a processor is removed, it does not respond when polled and is eliminated from the polling list, Datapoint explained.

Accesses to specific files are handled basically on a first-come, first-served basis, the spokesman noted. The file processor, equipped with up to 128K bytes of main memory, keeps most of the access records in main memory, thus speeding access time, the spokesman claimed.

Access Security

In most ARC systems each processor would be linked to a common bus through one RIM, communicating with all other processors in the system, but a feature allows more than one RIM to be attached to each processor. With this feature, a user can configure a system to enable one processor to access more than one ARC system.

For example, one ARC system could include an applications processor and a file processor dedicated to personnel records. Since these are sensitive files, a user might decide it would not be wise to connect these files into an overall ARC system covering many other application areas.

Another ARC system therefore could be set up to handle all of those other applications. One processor in the middle could have two RIMs, each attached to one of those ARC systems. The people accessing the nonpersonal applications would not be able to access the personnel files and the personnel subsystem would not be able to access the other application files.

However, the two-RIMmed processor in the center could access the files of both systems.

Up to six RIMs can be attached to any processor, allowing users to configure up to six such subsystems which could not access each other's files, or all processors could be fitted with double RIMs for duplication of the communications channel, the spokesman said.

Another way to keep files secure on the system is to allow an applications processor to have its own disk storage which can only be accessed by that processor.

Disk Storage

While in general all information filed in disk will be in the common files handled by the file processors, users can have disk storage on their applica-

tions processors for information they want to keep out of the common data base of the system.

ARC Products

In addition to the ARC concept, Datapoint also introduced several products to be used in ARC systems and which are compatible with its existing line.

Among the introductions was the 3800 series of single-user machines, which includes the 3810 and the 3820. The 3810 accommodates 60K bytes of memory while the 3820 can handle 128K bytes.

These systems can only be used as applications processors; they can generate and execute programs in any business language available to Datapoint users, the spokesman said.

3800 Series

The 3800 series processors support synchronous or asynchronous communications as well as Datapoint's Datapoint communications software and several emulators, the firm said.

Datapoint also introduced the 6000 series — a variation of the 6000 — for use with ARC. The two processors, the 6010 and 6020, contain a built-in program loader so no cassette decks are necessary. They can be used as ARC multiter applications processors, Datapoint said.

Typical ARC System

A typical ARC system with a 60M-byte file processor, one 6020 application processor, five 3810 applications processors, three multiport adapters, one Active Hub and 24 Model 3610 Datapoints costs \$115,450, excluding maintenance. A three-year lease price for this configuration would be \$4,938/mo.

The RIM box costs \$1,397 or \$50/mo to lease; the Active Hub is tagged at \$987 or \$30/mo; and the Passive Hub costs \$100 or \$10/mo. The DCIO feature costs \$22,908 including installation; it can be leased for \$918/mo including maintenance.

The 6020 attached processor costs \$15,216; maintenance costs \$150/mo and installations costs \$150. On a three-year lease, it is priced at \$573 including maintenance.

The 610 can be purchased for \$11,616, with installation costing \$150 and maintenance costing \$115/mo. It can be leased for \$438/mo.

The 3810 attached processor carries a \$10,790 price tag plus a \$150 installation fee while the 3810 costs \$6,950. Maintenance is \$120/mo and \$80/mo respectively; the processors lease for \$420 and \$273 including maintenance.

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Taxpayers' Records Vulnerable

GAO Faults IRS for Poor Systems Safeguards

By Jeffery Beeler

CW Staff

WASHINGTON, D.C. — The Internal Revenue Service (IRS) has failed to create adequate safeguards for its computer files and thus has opened the door to widespread abuse of confidential federal income tax records, the General Accounting Office (GAO) declared recently following a review of the IRS's data security system.

In a report prepared for Congress's Joint Committee on Taxation, the GAO charged that ill-conceived or loosely enforced IRS security precautions have left almost every taxpayer's computerized financial records vulnerable to unauthorized disclosure.

For the IRS, these findings probably could not have come at a more inopportune time.

For months, the federal agency has struggled — with limited success — to counter objections to the Tax Administration System (TAS) it has proposed as a replacement for its existing computer network. Most of the opposition to TAS has come from the Office of Technology Assessment (OTA), which, in a report issued last March, warned that the proposed system could endanger "civil liberties, privacy and due process" and could encourage surveillance and political harassment of taxpayers.

Now that the security of the current DP system has come under fire from the GAO, the OTA's claims about TAS may have gained added credibility. If so, the IRS's efforts to win congressional approval and funding for the proposed system may have suffered a setback.

Three Major Failings

Elaborating on the findings of a similar GAO report released earlier this year, the 83-page document blamed the alleged loopholes in the IRS's current data security system on at least three major failings.

The first of these problem areas — inadequate control over computer operations — has accounted for a variety of potential security risks. Programmers, for example, could easily run an unauthorized program or make an unauthorized program change with little or no fear of discovery, the GAO found.

"Magnetic tapes, each containing tax data on as many as 3,000 taxpayers, were not properly controlled and some could not be accounted for," the report noted.

The GAO also accused the IRS of serious failures to limit employee access to computer files. "Some IRS installations permitted almost wholesale entry to restricted areas containing sensitive tax data," the report said.

At other sites, supervisors failed to review tax data requests or spot-check retrieved data to make sure the requesters officially needed it, the GAO said. As a result, the IRS routinely allows employees access to unnecessary tax data.

The second major cause of breaches in data security is hardware shortcomings, the report concluded. The IRS's microfilm equipment, for example, cannot produce a transcript for just one taxpayer. Thus, when the GAO investigated 134 requests for micro-

film transcripts, the agency found the documents contained unnecessary data about 2,197 other taxpayers.

The third reason for leaks of unauthorized tax data is the IRS's failure to establish or enforce strict screening procedures for current or prospective employees, the report explained.

In some instances, "IRS placed employees in sensitive positions before obtaining required reports on their backgrounds," the GAO charged. At other times, the IRS allowed General Services Administration maintenance personnel, guards and even janitors unescorted access to tax return storage areas, the report added.

Although the IRS has long claimed it

has already taken adequate steps to safeguard the confidentiality of its records, the report claimed the agency has agreed with "most" of the GAO's recommendations.

Since the IRS first proposed the creation of TAS, data security has become a major concern for the federal tax bureau. Congress has already rebuffed the IRS's first proposed version of TAS on the grounds that the system might threaten taxpayer privacy, and Budget has also expressed reservations about TAS's ability to preserve tax data security.

The congressional rejection has prompted a major revision of TAS's

security features, which the IRS will unveil in fiscal 1979, when it will again seek budget allocations for the system.

TAS's backers claim the system is necessary to relieve the mounting DP burden on the current computer network, which is beginning to show its age after 15 years of operation.

They also contend TAS could process federal income tax returns up to two weeks faster than the current system, which consists of six IBM 360/65s and two IBM 370/168s at the IRS's National Computer Center in Martinsburg, W. Va., plus an assortment of 80 other large mainframes at the agency's 10 regional centers.

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In Computer Inquiry II Respondents Vie for FCC Attention

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Have you submitted your reply to the "reply comments" accepted by the Federal Communications Commission (FCC) in its second Computer Inquiry? Perhaps you will want to play the game...

It seems that along with filling its reply comments in the public record, AT&T sent separate copies of its views on where the agency should draw the line between DP and communications to each of the FCC commissioners. These individual missives also contained additional comments by the corporation concerning the inquiry and its issues, FCC sources said.

Within days, this "additional filing" by AT&T had come to the attention of the Computer and Business Equipment Manufacturers Association (Cbema). On Oct. 21, Cbema dispatched a letter from its president, Vico E. Henriques, to FCC chairman Charles D. Ferris and the other commissioners, expressing the association's belief that if AT&T had followed such a procedure, so could

Cbema.

Accordingly, the FCC commissioners received their own copies of the Cbema reply filing, along with "general observations" reflecting the positions taken by the association.

Before long, the Cbema letter came to the attention of GTE Service Corp., and for the first time, some outrage was expressed toward "unauthorized filings."

Calling the Cbema communication unauthorized and claiming violation of FCC rules, GTE maintained the association was trying "to gain an unfair advantage with respect to the other parties." This corporation, together

with its affiliated domestic telephone companies, recommended that the Cbema letter "be rejected out of hand."

In the event the FCC decided not to reject the letter, however, "we ask the commission to consider this letter as a response to [Cbema's] strained arguments," GTE continued. There followed a summary of GTE's views and answers to Cbema assertions.

GTE and Cbema had in common the fact that they sent copies of their letters to the other interested parties who filed comments and replies in the inquiry.

How about it? Wanna play?

Taped Lectures Explore Security

BERKELEY, Calif. — Three videotaped lectures by Prof. Lance J. Hoffman on techniques for security and privacy in computer systems are available for purchase or lease from the University of California Extension Media Center.

The tapes, available individually or as a series, are "Authentication Methods in Computer Systems," which outlines the various methods for verifying the identities of users, terminals and systems; "Authorization and Logging in Computer Systems," which details ways of determining if a user is entitled to access a source and shows the security and nonsecurity uses of a log; and "Modern Encryption Techniques," which explores enciphering techniques that can be used to enhance security and its related software and hardware.

Hoffman is a member of the electrical engineering and computer science faculty of George Washington University and has served on government committees on privacy and security.

Each of the tapes is available for a one-day rental fee of \$35 or can be bought individually for \$450. All three can be purchased as a package for the price of \$1,000 from the University of California Media Center, Berkeley, Calif. 94720.

Cepa Meeting Papers Out in Printed Form

ROCKVILLE, Md. — The proceedings of the recent meeting of the Society for the Advancement of Computers in Engineering, Planning and Architecture (Cepa) held in San Juan, Puerto Rico, is now available.

Copies can be obtained for \$30 from Joe Rodgers, executive secretary, Cepa, P.O. Box 1532, Rockville, Md. 20850.

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Users' Report...

"Winning Proposal" Winning Big

A step-by-step guide to proposal preparation is now helping many computer/EDP firms score big wins in their proposal efforts. Users of the book, entitled *How to Create a Winning Proposal*, report an impressive 42% average increase in the success-ratio of their proposal projects. Of the companies polled, 68% attributed their successful track record to the guidelines provided in the book.

Dubbed "Winning Proposal" shortly after publication, the much-needed volume has rapidly become an international standard guide for use in both government and commercial proposal efforts requiring a high level of sophistication. It covers the entire proposal process from start to finish — giving detailed instructions on contents, structure and methods of preparation for solicited as well as unsolicited proposals. Technical, cost and management section checklists are included to ensure the proposal team of covering all the important bases.

"... a nuts-and-bolts book, functionally prepared for usability as well as readability."

Microwaves Sept. 1976

national and multi-national corporations. For many project managers, it is a virtual *lemniscate* in the Sahara because of the valuable assistance it provides. All agree that the most outstanding feature of the book is usability. It enables the user to actually plan, write and submit a superior proposal with a high win probability.

"... a complete guide to planning, writing and submitting a winning proposal."

Convain Managair Feb. 1977

The authors cover government requirements in an overview of the U.S. procurement network, how it works, and how the proposing firm can increase its effectiveness in competing for contracts. Excellent guidelines are given on how to analyze and respond to RFP's, RFQ's and IFB's. Simplified formulas enable accurate costing-out of engineering, R&D, service, manufacturing and production projects.

Copies of *How to Create a Winning Proposal* are available pre-paid from Mercury Communications, Inc. 780-G Mission St., Santa Cruz, CA 95060. \$65 includes 3-5 day delivery inside the U.S. In California add \$3.90 tax. For outside the U.S. \$76 (incl. money order) includes air delivery. To order C.O.D. call 800-425-9444.

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TEXAS INSTRUMENTS.

Register to Link People and Jobs Set for February

DETROIT — Industry people looking for jobs and jobs looking for people will be matched at the Computer Science Conference's Sixth Annual Employment Register here.

Sponsored by the Association for Computing Machinery (ACM) and a number of university computer science departments, the conference will be held Feb. 21-23 at the Detroit Plaza Hotel.

The register brings together in one place a large number of employment-seeking computer people at all levels of experience and with a variety of academic degrees, according to Orrin E. Taulbee, register director. Organizations seeking to hire can thus conveniently find and interview these people, he added.

Applicants and employers must register on one of three types of official forms: (1) applicant, (2) academic and (3) business, industry and government. Employers should request one form for each type of open position and may list summer or temporary positions, Taulbee said.

Applicant and employer books of listings, consisting of completed forms, will be available at the conference.

Certified students can register free; the fee for non student employment applicants is \$5. Anonymous applications cost \$10, and each position advertised by potential employers costs \$20.

Additional information and forms are available from Taulbee, ACM Computer Science Employment Register, Department of Computer Science, University of Pittsburgh, Pa. 15260.

Arizona Professor Wins Wescon Lottery

GLENDAL, Ariz. — Prof. Renault Catalano, an instructor at Glendale Community College here, won a lottery sponsored by Data General Corp. at the Western Electronic Show and Convention (Wescon) recently.

The prize was a Micronova minicomputer with an operator's front panel, power supply, programmer's console and interface board. The system is valued at \$2,945.

Catalano's winning number, 1,295, was selected at random by the minicomputer from those attendees who entered the drawing.

Catalano intends to use his prize as the heart of a school computer that will acquaint his students with state-of-the-art technology.

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Hellman: Change the Laws

By Tim Scannell
CW Staff

NEW YORK — Changes in American laws are needed to protect the individual against the burgeoning effects of computer technology, Martin E. Hellman, a specialist in computer security, contended at a conference held here recently by the Council for the Advancement of Science Writing.

Hellman believes organized crime can be expected to make greater use of computers and their ability to store data in coded form in keeping records of illegal transactions.

If such records were subpoenaed by the courts or Congress, an individual or company could refuse to reveal the key to the computer-

coded information under the Fifth Amendment right.

Hellman cited as an example the recent Watergate affair involving ex-President Richard Nixon and what could have happened if the tapes had been in encrypted computer form rather than voice transcriptions.

"The records still could have been subpoenaed, but Nixon would have made a good case based on the idea that revealing the key for decoding them would not be in the interest of national security, and the contents of those tapes might never have been known," Hellman stated.

He also charged the National Security Agency (NSA) with improperly maintaining a monopoly

on coding systems and promoting standards of computer security the agency itself could break if it chose to do so.

In the future, nearly all financial transactions will be conducted through the use of credit cards and electronic funds transfer, Hellman predicted. "Consider the power an authoritarian government would have in depriving someone of the plastic card he needs to spend money... To deprive a citizen of such a card would make him a non-person," Hellman said.

Hellman feels that restrictions guarding against using computer codes in this fashion would help to limit the possibilities of the misuse of computer technology.

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'Brute Force' Could Break It Federal Encryption System Hit as Vulnerable

By Tim Scannell
CW Staff

The National Bureau of Standards' (NBS) encryption system for federal computers, endorsed by the National Security Agency (NSA), was designed to be just secure enough to corporate spies outside outside the government could not break a user's code — and just vulnerable enough so NSA could. This charge has been made by Dr. Martin E. Hellman of Stanford University, leader of a contingent of scientists who have warned the code can be broken.

In an article that appeared in *Science* magazine recently, Hellman contended a machine could be constructed that

could break a user's code by "brute force." This involves trying every possible combination of a code's key until the right one is found, Hellman explained.

The NSA, the NBS and IBM were involved in developing the encryption system known as the Data Encryption Standard (DES) [CW, Dec. 20]. The NSA, however, incorporated features into DES that were classified; critics feel this was done because to reveal them would be to reveal a simpler method to break the code.

\$50 to Break Code

The DES is a device that can be attached directly to a computer. Each

unit has a "key," a string of 56 bits (0s and 1s) which determines how the computer encodes and decodes data.

Each user of a system can generate his own key by choosing the order of the 56 digits. Once a user's key is uncovered, therefore, crypted data can be decoded.

With a key the size of 56 bits, the number of possibilities to discover the correct key is 2^{56} , according to Hellman. With the construction of a special chip designed to try one million keys per second, it would take about 10^{11} seconds or 3,000 years to complete an analysis of all the possibilities. If one million of these chips were

used concurrently, however, the entire range could be searched within one day or sooner, Hellman noted.

The cost of each chip is approximately \$10 for a total cost of about \$10-million, Hellman said. Allowing for the related hardware, power supplies and construction expenses, the total cost for a code-breaking machine would amount to about \$20 million.

Hellman pointed out, however, that considering the depreciation rate of such equipment, the total cost in 10 years would amount to \$200,000, with the cost of breaking a user's code being approximately \$50.

Hellman believes that implementing a larger key size — 128 bits, for example — would help alleviate the problem of security.

Impossible Secret

In the same issue of *Science*, Dennis Branstad, leader of the computer security project at NBS, and officials at IBM disagree with Hellman and his colleagues. They believe the DES is the best encryption device available.

Even if a code-breaking machine were built, it would require so much power, be so large and require so many resources that it would be impossible to keep its existence a secret, they said.

IBM claimed to have spent 17 man-years of effort in trying to break the DES using ways other than brute force. Its studies concluded there are no shortcuts to breaking the code, but IBM will release no evidence that might substantiate this fact.

It is the usual practice in cryptanalysis to document claims about the strengths of a particular system to promote its contention of being secure, according to David Snow, an official with the Mitre Corp. He questioned whether DES is secure enough to protect sensitive information, such as funds transfers between banks or privileged corporate information.

Hellman and his associates believe all of the doubts about DES could have been avoided if the NBS had chosen a scheme whose key was larger than 56 bits. IBM defended the size of the key, claiming it was chosen because it was a convenient size to implement on a chip.

Hellman contended people will accept the current code scheme because a government agency endorsed its reliability. "If the NBS tells them the DES is secure, they believe it," Hellman stated.

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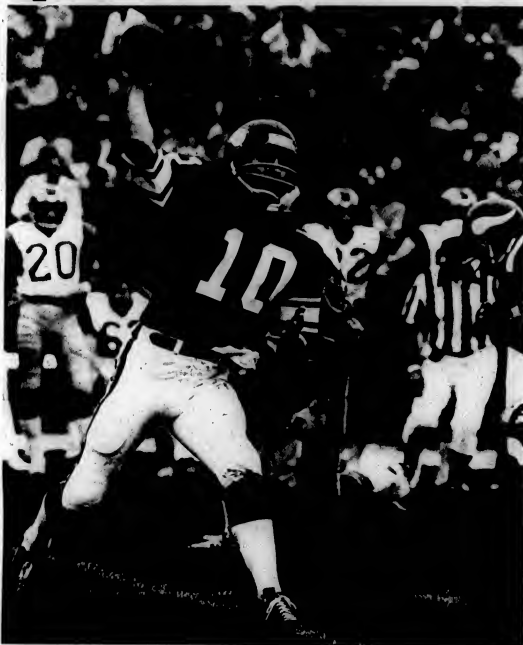


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Diebold Survey Finds Top Firms Lack Information Policy

By Ann Dooley
CW Staff

NEW YORK—Nearly 84% of the top corporations surveyed recently by the Diebold Research Program have no overall information policy and are "only now beginning to get an inkling" that such a corporate policy is necessary, a spokesman for the research group said.

Companies surveyed were mostly financial and manufacturing organizations and all had sales of over \$90 million a year. Only 26% of those companies had a central group or individual responsible for information policy, the study reported.

Some companies that reported having information policies turned out to have "relatively narrow statements" focusing on rules and records retention, access to classified data and certain specific security measures, Diebold said.

Information has become an important corporate resource and the time has come for companies to recognize that fact and establish adequate information policies, spokesmen for the research group told an audience at its 38th plenary meeting recently.

Many companies are unclear about what a comprehensive policy would be, the study explained.

Diebold defined it as a broad, overall policy that would apply to all departments so that a series of local decisions can be avoided.

Top Management Responsible

The responsibility for creating a corporate information policy must reside in top management and that person should be a management generalist rather than a functional specialist, the group suggested.

Management should consider the corporation's disclosure policy and what kinds of information should be made public, the study group suggested.

Other factors that should be assessed by management include security measures, evaluation and interpretation of information and whether the corporation has the ability to disseminate information at every level, which would be helpful in a decision-making process, Diebold indicated.

The group emphasized that in creating an information policy, each company needs to examine its individual requirements concerning the frequent problem areas of cost, organizational

resistance and privacy vs. "the need to know," quality and dissemination of information and new sources of information waiting to be tapped.

Resources at Hand

Information managers now have the resources to supply a much broader information product. Today, a manager can provide economic forecasting services for specific industries from internal or external data bases, the survey indicated.

Information managers can store or tap into reservoirs of legal, technical or business information and deliver this information to users. In addition, they can pool, analyze, evaluate, interpret

and disseminate statistical and textual information from all areas of the company on industrial trends, competitive activity, specific markets and technological developments, according to the research group.

Long Time Away

But the information policy idea is a "long way from taking hold" among large corporations, the group warned.

The Diebold Research Program, part of Diebold Group, Inc., is a private research organization sponsored by over 180 major corporations and can be contacted at 430 Park Ave., New York, N.Y. 10022.

Acpa Honors Isaacson

NEW ORLEANS—The Association of Computer Programmers and Analysts (Acpa) has chosen Dr. Portia Isaacson as this year's Acpa Fellow.

Isaacson was selected for her outstanding contributions to the promotion and recognition of DP.

The writer, teacher and lecturer, who was chairman of last year's National Computer Conference, is also known for her work with computer clubs and as co-owner of the Micro Store in Richardson, Texas.

"Dr. Isaacson's demonstrated concern and interest are indicative of her high standards of professionalism and involvement," Acpa said.

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Information Resource Manager Seen Coming

By Tim Scannell
CW Staff

NEW YORK — The expansion and rising importance of information and knowledge in the DP field is creating a new profession for the future, according to Jack I. Epstein, a member of the Administrative Management Services Division of Booz, Allen & Hamilton, here.

This new executive — the information resource manager — will be the "Renaissance man of systems" in the broadest sense of the word, Epstein said.

"This manager must have technical knowledge in several fields, experience in the design and implementation of all types of systems ... and the ability to sell systems concepts to office occu-

pants from the top manager on down," he emphasized in a recent speech.

The information resource manager will be responsible for the integration of word, image, data and telecommunications processing into a single human information processing support system. He would use information technologies to support human processing — that is, to support a

person's ability to acquire, assemble and act upon knowledge, Epstein explained.

Even though most systems executives have their own concept of the future office and its management, Epstein contended, they lack the sales ability to sell that concept to their superiors. If and when they get approval for improvements, few systems managers have both the technical proficiency and the power to effect these changes in office roles, he stated.

The success or failure of this new executive will determine the productivity and working environment for American office workers and managers, who will outnumber all other workers during the 1980s, Epstein concluded.

Kit Introduces Students to Computers

MINNEAPOLIS — A seven-piece computer project kit for students in grades 4 through 9 has been introduced by Edu-Pak Publishing.

Designed as a motivational device, the kit provides the student with a brief history of the computer, information on how to get data into a computer and answers to a list of most frequently asked questions.

The developers of the kit hope their product can be used as part of a mathematics or science course or as a course in itself.

Included with the package is a card

decoder, pre-punched with the alphabet, numbers and punctuation marks; a mark-sense card on which the students can code their name and address; a printed teletypewriter tape decoder sheet; and samples of

magnetic and teletypewriters.

The kits, which are color-coded, cost 20 cents each in quantities of 50 from Edu-Pak Publishing, P.O. Box 27101, Department CPK, Minneapolis, Minn. 55427.

USC Adds Chair In DP Science With Jones Grant

LOS ANGELES — The University of Southern California (USC) has been granted \$1 million from the Jones Foundation for the creation of an endowed Fletcher Jones Chair in Computer Science at the School of Engineering.

The foundation awarded the grant in recognition of the progress already made by USC in the area of computer science and because of its concern for computers in modern society, according to Dr. Zohrab A. Kaprielian, dean of the engineering school.

Separate Department

Courses in computer, technology have been offered by the engineering school since the early 1950s. In 1976, computer science became a separate department and moved into the university's Henry Salvatori Computer Science Center.

The Jones Foundation grant was established by the will of the late Fletcher Jones, founder and chairman of the board of Computer Sciences Corp.

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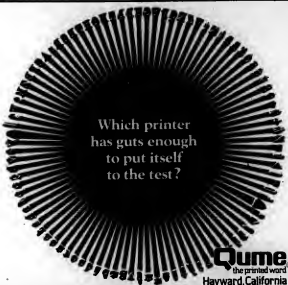
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Executive takes aim, but secretaries developed Swing.

Golfers' 'Swing' Proves Aid

TOKYO — A group of computer company secretaries who were sick and tired of manually calculating their

bosses' golf rankings for the firm's annual competition here have developed a computer program to do the work for them.

Known as Swing — or Score Writing Information for Golf — the program has been refined by the secretaries' employer, Nippon Univac Kaisha, Ltd. (NUK), the Japanese computer marketing firm jointly owned by Sperry Rand Corp. and Mitsui & Co. Ltd.

Trial Run

The program was first used this summer when 170 players from 36 companies in the Mitsui Group, one of Japan's largest industrial concerns, met for the First All-Mitsui Golf Competition at the Nara Sunland Golf Club, about 125 miles north of Tokyo.

Prior to the competition, all the participants' names, dates of birth, handicaps, team names and company names were entered in the files of a Univac 1108 computer system used by the Nippon Univac Sogo Kenkyusho Co., a NUK subsidiary. A portable terminal for entering score data was linked to the computer and a closed-circuit television set placed in the clubhouse to display the results.

Players Ranked

Upon completion of a game, the gross score of each player was fed into the terminal, which transmitted the data to the computer. The Swing program calculated the net scores and determined player rankings.

This information was displayed on the clubhouse television set almost instantaneously so the players could groan or cheer — depending on their individual results — at the prize-awarding party held after the tourney.

Directory Lists Southeast Sites In Eight States

ATLANTA — Correct Images, Inc. has announced the publication of a directory containing information on DP installations and vendors in eight Southeastern states.

"The Southeast Directory of Computer Installations" contains approximately 1,300 entries, each with the company name, address, phone number, key contact, hardware, languages, applications and computer time availabilities, the company said.

The directory will cost \$60 per copy before Dec. 15 and \$85 thereafter. Correct Images is at Suite 22-0, 300 Peachtree St. N.W., Atlanta, Ga. 30308.

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GM Sees DP Directing 90% of Manufacturing

By a CW Staff Writer
DETROIT — Ninety percent of all new machinery in General Motors (GM) manufacturing and assembly plants will be controlled by computers within 10 years, according to Elliott M. Estes, president of the firm.

A recent study estimated the use of computers in GM's manufacturing process will increase as much as 400% between now and 1982. This is compared with a 40% growth rate in the use of computers in the design functions and a 9% growth in data processing areas, a spokesman said.

A typical system, Estes told a group of design engineers, would consist of a number of basic, numerically controlled machining centers supplied by a parts-handling system. This would all be under the control of a minicomputer, which would in turn be supervised by a larger, main computer.

Such a system could be programmed to do work on a number of different parts within the same size range and perform simple assembly tasks.

Another computerized system Estes envisions is one that would use numerically controlled machines to paint cars. Although there is nothing unique about robots or machines painting similar portions of a car, he pointed out that to paint something as complex as the outside and inside of a car body would require a system of at least 12 machines which are constantly and simultaneously controlled.

Such a system, he believes, would be able to automatically adapt to a constantly changing stream of different kinds of automobile bodies — from station wagons to two- and four-door

sedans.

This system must allow for machine failure should any of the 12 "painters" fail to function in such a way that work would be redistributed without interruption or change in quality.

Computers have already played a major role in the design of new cars by analyzing exterior dimensions and suggesting reductions to improve mileage efficiency. Estes said computers will probably be the most important among a number of relatively new tools that GM uses to comply with the impending 1985 federal fuel economy standards.



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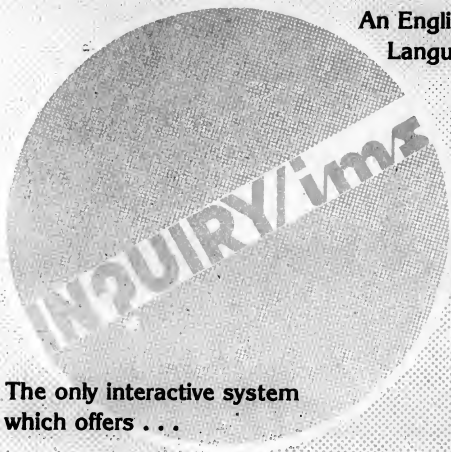
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Employee 'Threat' Groups

Team Method Urged for Outwitting Embezzlers

NEW YORK — Because American businesses lose millions of dollars annually to embezzlers, thinking up ways to cheat the company is going to be a fully sanctioned function of carefully selected "threat" teams in the future, according to a professor from the University of Virginia.

Speaking at a recent computer security conference here, Prof. Brandt Allen cited a growing awareness that traditional methods of preventing and detecting fraud must be supplemented by newer techniques like threat analysis.

As an example, he said auditors frequently cannot detect embezzlement, since catching embezzlers is not their primary function and common audit practices designed to test for fraud are not used unless suspicions are raised. Auditors are also hampered by DP systems, which they find difficult to audit.

Threat teams are composed of key employees within a company that meet as a task force on a regular basis to search for embezzlement opportunities. "Use of such teams is based upon the premise that people in the best position to know how to beat the system are those who work with it every day," he said. Allen recommended that an outside moderator familiar with financial methods be used to help guide the discussion.

Team Meetings

Threat team meetings should be given high status and approval by the company in locations such as the corporate boardroom. Participants need to be well-briefed, but not told anything before the meeting begins — to avoid the topic reaching the company grapevine, he suggested.

"If you've selected the right people," he said, "placed them at ease with the proper background briefing, stimulated their thinking with some examples and established a supportive environment, the discussion should start pretty much by itself."

Quick Scheming

How fast do they start scheming? Fifteen minutes into the first session, one threat team developed an idea that would work.

But no matter how freewheeling the group, there are certain guidelines that each moderator should exercise. Some classes of fraud such as "kickbacks, expense padding and similar known

problem areas" should be avoided, he said.

Positions, Not Personalities

Individual job positions, rather than the individual occupying a particular job, should be discussed and personalities should be avoided. Schemes requiring collusion should be discussed last, he advised.

Schemes that can be executed by one person, with or without an outsider,

should be discussed first.

Probing for variation on the same scheme is important. A review of basic schemes is vital since only about 10 basic schemes account for 90% of corporate frauds, Allen said.

"Corporate disbursement frauds, for instance," Prof. Allen told attendees, "are such a major problem that, if the discussion hasn't touched on it, he (the moderator) should ask something like 'How hard would it be to get a phony

vendor paid?'"

Threat analysis results, as reflected on recorded transcripts, are often valuable enough to put into practice after the very first meeting.

Within six months of the threat analysis program at one company, he said, an embezzlement was detected in progress. The scheme used was identical to one discussed by the threat team. The employee charged with the crime was not a member of the team.

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Editorials

Stalling Tactics

God's mill grinds slow, but sure.

— George Herbert

The mills of government — like God's — grind slowly, but the end result is rarely sure.

Two recent cases illustrate this point with some clarity.

First, the deadline for the National Commission on New Technological Uses of Copyrighted Works (Contu) to issue its final report was extended for seven months end, second, the battle over the FBI's control of criminal history records continued (CW, Nov. 28).

In the first case, it is probably true that Contu needs more time to tackle the complicated issues raised by technology in relation to the copyright system. But it is amazing — to those with long memories — that most of the issues being wrestled with have been evident since the mid-1960s.

In fact, the establishment of Contu was a method used by Congress so it wouldn't have to tackle those issues while revising the copyright laws.

Well over a decade has gone by since the problems surfaced, but there is still no resolution and now even a further delay has been added.

Operators — We Hear You

Computer operators often feel they are the neglected people of the DP community.

Too often viewed as less than professional, operators find their suggestions for improved operation in the DP department are ignored by management and their compatriots alike.

More than one DP manager has called operators "little more than glorified secretaries" who sit end-type at a console or mount tapes at the discretion of a machine.

And yet operators are in many ways the people closest to the operation of a computer center day in and day out. Because of this, they often see problems that are over-

ed.

On the second subject, there has been controversy over the FBI's storing and processing of computerized criminal histories since the original plan was announced — more than half a decade ago.

And while this controversy has moved into new areas, the basic issue is still whether the FBI should serve as a national police force.

Now two more bodies will study the problem — one in the White House and one in Congress.

What is needed to get these issues resolved, it seems, is a little less study and a little more leadership on the part of Congress and the White House.

In many ways, both issues are not ones that can be resolved solely on the basis of facts alone. They are issues that will require subjective decisions on the part of our elected officials.

Putting off decisions through the use of study groups and the like is easier than standing up and being counted, apparently, but these are two issues that have been studied for too long.

looked by enlists and program-

Computerworld is interested in hearing from operators who have tips on improving the efficiency of DP centers — or general comments on the life of operators in general. If you're an operator and have a suggestion or comment, write to us.

We'll listen — and we'll print suggestions that either have a wide applicability or are novel in their approach.

Instead of complaining about being ignored, write to Tim Scarnell — an ex-operator — at CW. It will be a service not only to your shop, but to others facing the same problems.

Data Past

Five Years Ago
Dec. 8, 1972

DOVER, Del. — The DP director for the State of Delaware charged IBM with trying to ruin his career because he chose another source for DP equipment. "An IBM representative came to my office end, in the presence of witnesses, informed me that I was 'finished' in the state," Arthur Hill, director of central DP, said.

The IBM representative, according to Hill, stated IBM had planned to support Hill in the state administration, but his decision to go to third-party leasing changed all that.

Eight Years Ago
Dec. 10, 1969

PHOENIX — General Electric up-

dated the 800 line with its fastest system to date, the Model 855. Twice as fast as the company's earlier Model 835, the system was priced to compete at the upper end of IBM's line. Costing around the same as an equivalent-core 360/75, the 855 was less expensive and less versatile than the 360/195 in terms of what a single processor could do, the company said.

WASHINGTON, D.C. — Users responding to a Patent Office request for ideas on computer program patentability said program protection was vital if software development was to continue at any reasonable pace. But the suggested methods of protection varied.



'Would You Believe Two Hysterectomies on the Same Patient — and a Set of Twins in Between?'

Letters to the Editor

Feeble Sales Techniques

I have long felt it is very important for DP users to carefully evaluate the offerings of all vendors, not just those of IBM. In many cases, value received for dollars spent can be maximized by dealing with other equipment manufacturers.

However, I am reaching the conclusion that whatever sales success IBM's competitors enjoy is in spite of their marketing efforts, not because of them.

I am presently working on a project for my employer that will utilize a small computer system at an outlying location, supported by a large IBM installation here in Atlanta. I would like to cite two of several experiences I recently had with non-IBM vendors.

Upon seeing an advertisement in The Wall Street Journal for a new minicomputer, I telephoned the local sales office of the vendor for additional information. People in the office were not able to satisfactorily answer my question but promised to get back to me.

About two weeks later, the sales representative appeared at my office, without an appointment and unsure of my name, with a thick sales manual under her arm. We discussed my project at some length, but my questions again went largely unanswered. I am still waiting.

I worked for several days with another vendor of minicomputer systems who has a reputation of providing a very workable data base management system for its hardware. I wanted to set up a demonstration that would simulate the proposed system for our management. I constructed the data base and keyed data with little assistance from the vendor.

The vendor's personnel never did become familiar with the data, even during two sessions given for our managers.

I still feel we would all be hurt if there were only one vendor of computer equipment, but with competition like this, IBM may one day enjoy this position.

John D. Beck

Atlanta, Ga.

View From the Beach

The excerpt from Charles P. Lecht's *Tsunami* (CW, Nov. 21) dealing with arguments against the proposed Federal Information Processing Standard leaves me confused as to some basic issues. Lecht may indeed be an effective businessman, but as a writer he is guilty of casually vague prolixity. As an analyst, he is guilty of proceeding from unexamined assumptions.

The assumption that most concerns me is that the rapid expansion of the computer industry is a good thing, and the result for this article is that it reduces simply to a matter of whose ox is to be gored. Lecht admits that the computer industry is not consumer-oriented; I am unwilling to drop the matter there.

Where is the societal good from the rapid technological change he wishes to nurture? I do not ask this question out of a Luddite schadenfreude at the prospect of slowed growth, for as yet I have no clear view myself. I see it, however, as a pressing prior question.

I suppose I am suggesting that from the beach, the waves of change appear more and more like tsunamis as one's nose gets closer to the water. A visit to the mountains might refresh Lecht.

Peter S. Grehm

Brenford, Conn.

Does NSA's DP Violate Fourth Amendment?

By Jack Stone
Special to CW

The long-suspected practice by the National Security Agency (NSA) of massive interception of American citizens' international radio communications came to light recently in an article by Deborah Shapley in *Science* magazine.

She reported NSA's capability for "sweeping up hundreds of thousands of simultaneous communications" is so vast that, in the words of one expert, it is "ripping open" legal protections of the privacy of American citizens. (Whether the Fourth Amendment?)

She noted that telegram and Telax messages are easily converted into a machine-readable format suitable for computer processing, but that telephone talk is really tough to convert accurately.

I concluded, however, that with the professional dedication of hundreds of NSA scientists over the next decade, blessed with billions of tax dollars and tons of secret laboratories, the automatic-speech-recognition barrier will be broken and NSA will boldly move into the thrilling new frontier of wholesale processing of Americans' overseas telephone calls.

But not without a few bugs in the system, I'll wager.

The time: April 1, 1984. The place: the catacombs of NSA/HQ on a

quiet, sun-drenched tree-lined street in a village of suburban Washington, D.C. The scene: A brace of super-duper computer monsters churn furiously, gorging on their regular feed—all the radio communications on earth for the past 24 hours. The occasion: USAF General M. Wellington Tarn, a specialist in helicopter tactics, has finally been okayed by the Senate as the new director of NSA after an exhaustive review of his banking connections.

The general entered the computer center with his retinue for his first inspection, an unannounced one that takes place on third shift.

The group slithers up to the console.

"Surprise!" they sing. Private Sorney, console operator, almost goes through the calling bell, but composes himself and snaps to attention. "Sorry, sir, but we haven't had any visitors here on this shift for a long time. I'm afraid it's a bit unduly."

"Harrumph, son. Don't fret. I fully understand you are on duty protecting the security of this nation and that may require some compromise with those reactionary environmentalists."

"Now what's this thing here?" He points to the operator's console which seems to have an unfinished game of tic-tac-toe on the CRT display.

"Uh, sir, this device is used to

communicate between the systems organization for computer operations and the computer's operating system's organization. That grid structure and those Xs and Os constitute the secret language we use.

The Human Connection

Gosh, it's taken me years of experience and training to come up on it."

"It does look rather complicated," he responds.

He wenders over to the high-speed printer which appears to be listing out renditions of characters from the Peanuts comic strip. "And what is this artifact doing?"

"Sir, this is the output from a hush-hush job we're doing for the CIA. Has something to do with computer-generated disguises. Scuttlebutt has it that they don't want any repetition of the Watergate fiasco."

The general nods approvingly. "Good, good. Now what's this thing here?" he asks as he picks up what looks like a stack of 45rpm phonograph records rigidly fixed to a rod running through their canters and separated from each other by about half an inch.

He notes its label is "foreign inter-

cepts" and blows off the dust and spider webs. "Sir, that is our ultra mass storage" used to record telephone conversations on non-English-speaking Americans." Sorney volunteers.

"We don't mount it very often since it's not much fun to listen in if you can't understand the language. We really have improved the morals around here since we directed all of our resources to English-language intercept only."

"Man, some of those phone calls are really wing-ding! Watch this. I'll enter four key words into this special console: German, killer, hijacks, airplane. Now listen to that loudspeaker for the response."

The speaker crackles with, "Hey, Joe! Shelley Berman here. Listen to this killer. Some guys are playing Jacks Hi and—wait—second—oh, thanks, Scotch plain, no soda—anyway, these guys."

The private shuts it down fast, saying "General, we still have a few systems problems... Hey, watch! Don't trip over the input cable! Oh, oh, you broke it!"

And so the American people were at last emancipated from one dimension of their electronic bondage... but only for the 10 minutes it took Pvt. Sorney to solder the wire.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

Analysis Shows Complexity of DP Liability

Judge Motley's comparisons between architect/client and DP specialist/client relationships—brought out at a recent pretrial hearing of the F&M Schaefer suit against Electronic Data Systems Corp. [CW, Nov. 26]—point up significant similarities and differences between the two professions. Both are complex, so the layperson faced with professional discussions and recommendations cannot be expected to have the competence to check this out for himself.

Both also combine science and art. The architect knows the strength of materials and the building codes that are necessary on the site, and yet has, as his prime competitive challenge, the ability to create an economical, beautiful structure. Similarly, the system designer has certain items that are scientifically based, but often the choice of some outstanding features is a purely aesthetic one. An example would be design on an on-line display or even the decision as to what displays were to be on-line.

When it comes to malpractice, this distinction between science and art is important. No one says the architect is responsible [legally, that is] for even the ugliest struc-

ture as long as the client has seen it and approved it. But the client's approval of the building's aesthetics does not carry with it an approval of a possible breach of the fire escape regulations, even if it is implicit in the artist's sketches of the building. That is in the architect's special province.

But while there are many similarities between the architectural and DP professions, it is enlightening to analyze some major differences.

First, the computer system designer currently has a much less personal role to play in creating and maintaining a design compared with an architect. Even if the client knows who the designer is, in many cases it is not the firm that is responsible for the design. In DP, firms hire designers on a month-by-month agreement, with no provision on either side that the chosen designer will handle the whole of the task. By contrast, once an architect has been chosen, he can expect, and be expected, to see the job through.

The computer system designer, like the architect, nowadays relies upon various predeveloped components, such as language compilers, operating systems and hardware, much as the architect will use elevators, window fittings and other prefabricated items. However, computer components can be changed—even after delivery and installation—without the designer becoming aware of the problem

and without its being apparent to anyone. This, of course, can raise the question of contributory negligence by the designers of the various system components.

An expert in an operating system can, without knowing anything else about a system, effectively take over a whole DP system and make it use false records or give out protected information on personal matters, for example.

With the growing sensitivity to privacy considerations and the increase in fraudulent uses of computers (bank frauds up 10 times in 10 years, for instance) this vulnerability through subcontracted personnel is clearly much more intricate than in the architecture use of inspectable, noncritical components.

Architects, like computer designers, often sell their products to other firms who hire specialists on their own staffs. However, in DP, the basic information upon which any specialist would have to work in order to see flaws in a design is simply not as available to the client-specialist as to the vendor-specialist. This is because of the use of "trade secrets" to protect software and hardware rights.

Both the vendor-specialist and the client-specialist would reasonably be expected to know the strength of an L-beam, but the controls used in a software routine or a piece of maintenance history of a piece of hardware is often not available (and may even be lied about) to the client-specialist. This appears to

put a potentially greater load on the specialist who has access to the information than on the client.

Design Modifications

The problem of modifications after the design has been created is equally important. An architect normally produces signed end dated blueprints and the builder has the responsibility of following them. In DP, the equivalent "specifications" are simply not regarded by the programmers as being truly final documents. Often, they cannot be regarded as finalized because of areas that are not addressed or inconsistent information from one part to another. Essential parts of the design may be modified—with or without the designer's knowledge and approval—many times both before and after the system goes into production.

This last distinction may require that "programmer's liability" be considered in addition to "designer's liability."

These four points—less personal connection, component changes, trade secrets and programmer changes introduced into designs—all differentiate the DP malpractice situation from the architectural one. In sum, as I see it, the differences between architects and DPs point up even more responsibilities for DPs.

Please let me know your thoughts on this matter—and those of your colleagues—so they can be passed on to other readers. Feel free to distribute copies of this article.

**The
Taylor
Report**
By
Alan
Taylor
CDP

IBM Document Coverage

I must protest Computerworld's incorrect and shabby coverage of IBM documents recently introduced into the U.S. vs. IBM trial. In the Nov. 7 issue, CW distorted the facts in the news stories and then sued those distorted reports to draw an unwarranted editorial conclusion — "... that IBM tried to 'launder' its files in a manner that would make its position in the industry harder to detect."

From the news stories:

• A Dec. 11, 1970 memo, written by one IBM employee to one other employee with a single carbon copy was reported to be a memo "... directing company executives to 'clean out our files' ..."

• Reporting on another document, a 1968 "... list of points to be kept in mind ..." CW ignored the fact

that the document shows no author and no recipient and concluded that "... firm members were cautioned ..." by it.

• A 1965 set of minutes of a Management Review Committee meeting was said to be edited for public view. The proof, CW said, is that a second document labeled "... minutes of the Management Review Committee ..." is "vastly different." The fact is, however, that the second document is not minutes, but a memo sent by a lawyer who attended the meeting to another lawyer who did not attend. It differs only in that it contains more information about some matters, not different information about any matter.

Letters to the Editor

Then, an outlandish editorial said "IBM managers were instructed to remove certain documents from their files." Not so. The important phrase in that Dec. 11 memo — on which the editorial seems to have been based — is "in accordance with legal advice." That phrase reminded and cautioned the employee that certain material had to be retained. IBM offered memos containing that legal advice for inclusion in the record.

For a long time, we have followed strictly enforced instructions on records retention. As a consequence, we have bulging warehouses full of paper through which the government and others have been sifting for years. Thus, there are no hidden

answers as the Nov. 7 editorial suggests. Just answers that do not fit our adversaries' — or CW's — preconceived ideas.

The distortions did not end with the Nov. 7 issue. The Nov. 14 issue continued the irresponsible coverage, particularly in the incorrect article which said that certain IBM documents "equated 'national interest' with the firm's 'financial interest'." There is one document that uses the term "financial interest" and it does not say "the firm's financial interest" [nor the firm's financial interest, nor IBM's financial interest]. It simply says "financial interest."

CW inserted the thought that it was IBM's financial interest, even though the article itself makes clear that the memo was part of a debate about what kinds of government interest should be included within the meaning of national interest.

I hope it is very clear that I am not simply complaining about unfavorable inferences. I am also protesting the unjustified insertion of words and thoughts into your reports on the documents.

J.R. Young
Vice-President
Communications

IBM
Armonk, N.Y.

Erratum

The following paragraphs were inadvertently omitted from the conclusion of Chapter I of Tsunami [CW, Nov. 21]:

"As we enter the 1980s, the I/O issue is but one of the many major issues confronting our computer industry. After many years of believing some purpose might be served by a new antitrust investigation of the computer industry, I've changed my opinion as of late.

"Not that violation charges might not warrant this; judges, attorneys and courts are around to handle these affairs. But I cannot help but feel that actions started long ago in our industry are subject to the waves of technological change too, causing increased obsolescence in their merit.

"Characterizing our industry as being in turmoil, Business Week in April 1977 issue said at the same time that gigantic technological breakthroughs are occurring. It seems a strange time to divert the industry's resources to answer unclear complaints. Increased scientific concern to promote its interests is long overdue.

"It is time we started to view our computer technology for what it is: a national resource available and operating within our environment, the power of which provides more promise for our society than any other technological innovation in modern times. A national policy is needed, the government's long-term goals must be explained and support to our industry provided so that its current position of world leadership is not further eroded."

Charles P. Lecht

New York, N.Y.

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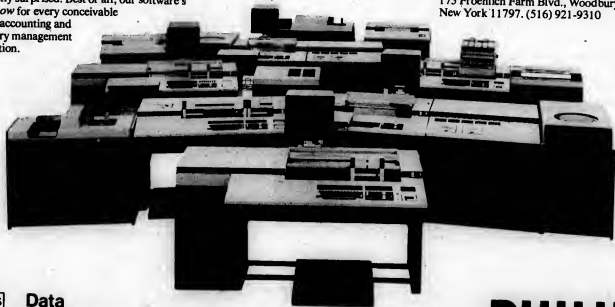
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And Withstand Architecture Changes

Rating System Must Fit CPU and I/O Units

By Kenneth W. Kolence
Special to CW

In the recent editorial "Apples and Oranges" [CW, Oct. 24], the need of our industry for a "meaningful and fair" computer rating system was correctly identified. In response to the call for inputs on this question, I would like to offer my analysis of the problem.

To begin with, the problem is not simply a problem of rating or establishing the "power" of a given CPU. We unthinkingly accept a distinction between CPUs and I/O configurations and devices, but the fact is that it is impossible to find any innate characteristics which differentiate the two classes.

The differences are only functional, and even then the differences are quite often difficult to clearly distinguish.

The editorial noted Mips rate and throughput ratings are both desired. But the former applies to just the CPU and the latter to the overall configuration.

The implication here is that both types of "power" must be determinable and, beyond that, both must be in identical units of measure. This criterion is obvious when one realizes that no innate distinctions exist between CPUs and I/O systems and also when one realizes that both the CPU and I/O powers of the system affect the throughput capabilities of a configuration.

Because of this, one must be able to express CPU, I/O and overall configuration power in precisely identical units.

A second fundamental point that leads to essentially the same conclusion arises from considerations on the use of absolute vs. relative power "ratings." In the CW ratings which triggered this discussion, the numbers given for CPU power are strictly relative to an assumed value of 10 for a 360/50. That is, a 370/168-I with a "power" value of 100 is assumed to be 10 times more powerful than a 360/50.

The simple problem with this approach is that it is completely meaningless insofar as predicting the actual capability of a configuration to process additional load in the same amount of time. The effects of available I/O power must be taken into account.

Any given IBM CPU cannot be assumed to process 10 times the load of a 360/50 CPU in the same period of time. Depending on the I/O configurations and device speeds, it may be more or it may be less.

Fundamental Requirement

Thus the fundamental requirement of a "rating" system is that it be generally determinable for CPUs, for I/O configurations (at any level, down to the device level) and for any combination of CPUs and I/O configurations. The power of any given element of a configuration must be calculable, as well as the power of the full configuration.

This in turn means that only absolute power values are meaningful

in a practical sense because of the vast number of configurations needed for any relative "rating" system. Again, if the absolute power of combinations of configuration elements is to be established, then the power of each of these elements must be expressed in the same units of measure.

A third set of criteria arises from the recognition that these "ratings" are essentially an attempt to define what we mean by the term "capacity." Clearly, capacity has the dimensions of power; e.g., work per unit time.

This comes from our common meaning when we say we have run

out of capacity. This does not mean we cannot complete our work, it means we cannot complete it in the time allotted.

Now, the idea of capacity as nor-

a critically important observation which leads to a fundamental recognition of how much absolute power ratings can be used.

There must exist an absolute power in some sense for any given combination of CPUs and I/O devices, including the individual CPU and/or I/O device. However, how much of this power can be used by a given workload will determine the rate at which the configuration or device can process the workload. Thus, different workloads will operate at different power levels, depending on the workload's characteristics.

(Continued on Page 28)

Reader Commentary

ally expressed is that capacity is measured, and measured relative to some workload. The idea of an absolute power rating simply does not square with this common view of capacity, and this turns out to be

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BRAEGEN

Rating Must Work With CPUs, I/O Units

(Continued from Page 27)

The first observation from these considerations that becomes a criterion on any "rating" system is that it must be calculated from theoretical considerations, not simply measured. The reason is simple: If the "capacity" is derived purely by measurements on the actual power levels observed, then one does not know if some other workload could operate at a higher power level.

Only theory can establish what the maximum would be, and this would concurrently define the "ideal workload" for any given configuration.

All of performance tuning shows us that indeed it is possible to modify the workload (or the configuration) to obtain higher power levels, so a "measured capacity" is not a meaningful number to use in a rating system.

As a second important criterion in this set, the property (i.e., power) used to rate the capacity of configurations and configuration elements must also define the term "performance." This must be true because increasing performance generally increases the rate at which work is actually performed, and absolute capacity is the maximum possible corresponding rate.

The third criterion is perhaps less immediately obvious, but becomes intuitive quickly on a little reflection. It can be stated as follows: Any method of determining the power

of a configuration or configuration element must mathematically relate directly to the methods of quantitatively characterizing the workload or any portion thereof.

In less precise terms, if we talk about the rate at which equipment can do work, then we must be able to express numerically the quantity of work represented by an application, the operating system, etc. This is necessary if we are to be able to use our values for power to predict how long it will take to complete the programs.

Unless we have this ability, the "rating" system or power values is not useful for its intended purpose. A last characteristic arises as a consequence of having made these criteria and can be used to determine if in fact they have been met. In a secondary sense then, it too can be considered as a criterion.

This is that the theoretical calculations of capacity must clearly identify how the equipment power depends on the characteristics of the workload.

For example, for disk drives the resultant power calculations should show how power varies as a function of block size and seek time as well as byte transfer speeds. For central processors, power must be a function of internal speeds, instruction mixes and memory alignment characteristics.

Thus we see that a satisfactory system of "rating" power or capac-

ity should give us the ability to predict the affect of changes in both equipment and the workload on the actual rate of completing the work.

The editorial stressed the need for a "fair" as well as meaningful rating system, and correctly identified the need for it to be generally accepted if it is to be of any value. In my opinion, a fair system would be one which:

- Everyone can calculate or determine for themselves, and yet which will result in the same values regardless of who does the calculations.

- Is equally applicable to every level of equipment and every form of architecture (don't forget, the rating system must apply to both micros and to full distributed CPUs).

- Experimentally can be verified at each installation.

In other words, "fair" means embodied in a general theory or methodology which will not need to be thrown away when some architectural (software or hardware) change occurs.

Dedicated, Not Unbiased

The last need identified in your editorial was for someone unbiased enough to find the way. In one sense this is difficult because anyone interested enough to do something about the problem feels strongly, and this means he will appear to others to have biases.

Rather then be unbiased, I believe one needs to be dedicated to only using measurable, observable quantities in the development of such solutions.

I cannot measure CW's CPU power ratings by measuring a 360/50 and then a 370/168 and expect always to come up with a 10:1 ratio for two reasons. The first is the most important: it is not defined in measurable terms. The second is that the method by which it was arrived at is not precisely quantitative.

The same is true with most other

comparative rating schemes. The industry will only accept as fair and unbiased techniques which are both general and experimentally repeatable in anyone's installation.

Clearly, if one accepts only some of my proposed criteria, one will come to recognize the ability to establish the power of CPUs, I/O systems and full configurations lies at the heart of a deeply important problem area. In my opinion, this is a central problem of the field of software engineering, and must be solved in a quantitative way before software engineering begins to be worthy of its name.

For this reason, I have dedicated the better part of a decade of effort to developing theory and techniques for solving these problems — software physics.

I strongly applaud CW's efforts to at least bring out into the open the problems of rating systems. It can only be a service to the industry.

Kolencia is the developer of software physics and was the inventor of software monitors. He is currently president of the Institute for Software Engineering and the founder of Boole & Bobboge. He was the initial recipient of the A.A. Michelson award, given by the Computer Measurement Group.



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UK User Discovers

Package Eases Move to IBM Machine

By Don Leavitt
CW Staff

LONDON — Even when everything surrounding the conversion of functioning programs from one environment to another seems to be working toward making the change easy, things never seem to work out exactly right.

It was no surprise, therefore, that the people in charge of a large-scale installation facing such a changeover two years ago foresaw a great many factors weighted against the success of the effort.

But by anticipating many of the problems they would face, planning how to counter them and finding a unique software package that tackled one of the toughest of these problems by itself, they got the conversion completed on time and with a smoothness that seemed to belie the worries preceding the project.

'PC/70' Update Expands Control

PHILADELPHIA — Version II of the Project Control/70 (PC/70) system, now available from Atlantic Software, Inc., is said to provide users working with almost any of the major mainframes better facilities with which to plan, monitor and account for the progress and costs of any project.

The latest release includes enhancements in half a dozen areas, a spokesman said. The self-contained spooler, for example, allows distribution of reports to be grouped by manager and location regardless of the sequence in which they were created.

At the other end of the process, the system has reduced the amount of input by generating many task assignments from a single transaction, according to the spokesman. Task estimates

For various reasons, the user's name must remain anonymous, but the facts behind the effort were spelled out in a confidential report prepared by a member of the organization a year ago.

The user was faced with converting from multiple International Computers, Ltd. (ICL) System 45 to an IBM 370/145. The 145 was installed in January 1976, and the changeover had to be completed by June.

The author of the report tallied

eight reasons why, in that user's context, the conversion might be more difficult than usual. In the first place, 500 programs including approximately 576,000 instructions had to be converted.

Because they had been built up over nine years, "a high degree of systems integration" had been achieved and key files were used by several applications. Thus all systems affecting these files would require testing together once they were converted, the re-

port noted.

Because the conversion was between different manufacturers, all procedures required detailed attention. Every line of source code had to be scanned to watch for such details as the different punching instructions for the pound sterling.

Reduction of the staff allocated to the project was a significant factor since their backgrounds were almost en-

(Continued on Page 36)

System Manages PDP-11 Data

HARTFORD, Conn. — The Quodata Data Management System (QDMS) introduced by Quodata Corp. addresses two different problems for the Digital Equipment Corp. PDP-11 user, according to the software house.

First, the system provides a solution to the needs of the non-DP-oriented end user who wants

a means of maintaining and organizing data and later retrieving pertinent pieces to develop meaningful information. An English-language command structure supports this use, a spokesman explained.

Second, QDMS provides a nucleus of "building blocks" which can be used by a programmer to

create new applications. These reusable blocks of code are, in effect, modules built from series of commands, each meant to handle one specific DP task.

Many man-years of development effort were necessary to evolve the underlying building blocks of the system, the spokesman claimed. These included "powerful, efficient and flexible subsystems for sorting, reporting, writing, CRT display control and data base creation," he said.

The report writer has been called the backbone of QDMS. It accepts the English commands from a CRT, prompts the user and gives available options when the user tries to determine what to do next.

Facilities include calculations and totals both down and across files including n-level control breaks and label and form letters preparation, Quodata said.

The sort subsystem can reorder any entire file or simply sort a pointer file. Both QDMS files and those created elsewhere can be reordered. Selection capability is also a part of the sort subsystem, the spokesman noted.

QDMS runs under DEC's RSTS/E environment. It costs \$5,000 and is available now from Quodata, 196 Trumbull St., Hartford, Conn. 06103.

are computed by PC/70 based on percentage of the project budget and resources can be assigned by the system based on skill level requirements, he said.

A model or estimating analysis report is said to help the user develop estimating standards based on the installation's unique environment. It also provides guidance for fine-tuning of those standards based on actual performance and makes future estimating easier and more accurate, the vendor claimed.

Version II allows the user to produce reports on current projects or to invoke the system's planning facilities on a selective parameter entered at runtime. This makes mid-week simulation runs far more practical than they have been until now, the spokesman said.

The system provides a means of

showing that a task within one project is dependent upon a task in another project. This results in easier and more accurate scheduling and keeps users alert to otherwise unforeseen "chain reactions" caused by slippage in apparently unrelated projects, he added.

An automatic time printing/reporting option enables the user to eliminate time sheets, using planned times as actual time worked in a period but with a manual override facility to report significant exceptions to the expected work pattern.

PC/70 runs on Burroughs, Control Data, Honeywell, IBM and Univac mainframes. Written in ANS Cobol, it costs \$15,000 and can be ordered from Atlantic in the Lafayette Building, 5th and Chestnut, Philadelphia, Pa. 19106.

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*James E. Dunn, Manager of Computer Services,
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DBMS on Infonet Works for Novice Users

EL SEGUNDO, Calif. — A data base management system (DBMS) recently installed on the Infonet remote-computing network provides four interface levels to ease the system's use by people with varying degrees of familiarity with computers, according to Computer Science Corp. (CSC), the Infonet vendor.

At the same time it announced the DBMS, CSC announced a change in the cost of disk storage on the network. A spokesman said the change could save users of substantial disk space "more than 60%" of the storage charges they faced under previous billing plans.

The DBMS, Manage, supports an interactive query facility so that non-technical users can produce reports and create subset data bases, through English-like commands, with prompt-

ing features.

On the next level, the system includes a procedural language that allows the user full control over access, arithmetic and logic operations.

A programmer interface permits the DP technician to utilize data in connection with programs written in Cobol, Fortran or Assembly language. Finally, a data definition language said to be based on Codasyl specifications was designed to ease the description of

the user's entire data base, presumably by a data base administrator.

Manage reportedly allows the user to interrelate the data files it manages into virtually any data architecture needed. It supports both simple and complex relationships, including network and hierarchical structures, the spokesman said.

The software is completely compatible with Aladin, a data management system Infonet introduced three years

ago, he claimed. Users can therefore implement new information systems using multiple Aladin files.

The reduced price option on disk storage is open to users who purchase blocks of 2,000 pages each. Such prior commitment allows the network to sell the space at less than half the standard page/day pricing, the spokesman said. The network is headquartered at 650 N. Sepulveda Blvd., El Segundo, Calif. 90245.

As They Get More Popular

Study Sees DBMS Growing More Alike

MINNEAPOLIS — Virtually all generalized, commercially available data base management systems (DBMS) are growing more and more

similar, thus placing an increasing burden on users who must evaluate

The findings reported in the accompanying article are the result of the first phase in a two-part research study being undertaken by Info-Dyne. To provide credibility, the company wants to expand the base of remote computing service users interviewed. Organizations interested in working with Info-Dyne are asked to contact Richard Sherman, president, at Suite 196, 4600 W. 77 St., Minneapolis, Minn. 55435.

and select the right system for their applications.

This is one of the most significant

trends to emerge from an updated study entitled "Data Base Management Systems — A Use and Availability Study in the Remote Computing Environment," one of a series of studies being conducted by Info-Dyne, Inc. into aspects of the remote computing services (RCS) industry.

This edition includes all the information contained in Info-Dyne's two previous DBMS studies plus many more products, vendors and user comments. "The significance of the data received from the initial study of users surveyed convinced us that a continuing dialog with DBMS users would be beneficial to both users and vendors," J. Richard Sherman, president of Info-Dyne, said. "The updated report provides a finely tuned state-of-the-art view of the current DBMS impact in

(Continued on Page 34)

Digest Aids CICS/VS User

HAWTHORNE, N.J. — A pocket-sized CICS Reference Handbook from On-Line Software International (OSI) is said to be the first complete quick reference digest compiled for the CICS/VS user. It reduces "significantly" the programmer's need to refer to IBM's "voluminous" manuals, OSI said.

While programming, for example, the handbook may be used to get the correct syntax for both the CICS/VS macros and the new high-level language commands available with

CICS/VS Version 3.1.

The location of key fields in control areas used when CICS/VS requests are issued are also provided for debugging purposes, a spokesman added.

The handbooks cost \$5 each for the first five copies and \$4.50 each when ordered in quantities up to 20. Further discounts are available for larger quantities; single copies ordered for evaluation are free.

OSI is at Software Plaza, Rt. 208, Hawthorne, N.J. 07506.

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- The QM-1 is an excellent design tool for analyzing software structure, system composition and hardware/software trade offs.
- The QM-1 is ideal in a computer science environment for instruction and research into hardware and software architecture.

Prices range from \$190K for a minimum system configuration, capable of running Nanodata supplied software, to upwards of \$700K for a multiprocessor. A typical customer configuration sells for \$260K and includes emulators of the PDP 11, Data General NOVA, IBM 360, etc.

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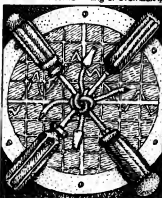
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Different Vendors' DBMS Growing More Similar

(Continued from Page 32)
the computing — and especially RCS — industry."

The Minneapolis-based firm, which specializes in consulting to users of remote computing services, undertook to update and improve the study early in 1977 after observing the impact of DBMS on the RCS industry and the importance of earlier DBMS reports. In every instance where Info-Dyne has had an opportunity for first-hand observation, a rapidly accelerating trend in the use of DBMS appears to be taking place. The new report describes the benefits of this trend, as well as the pitfalls, to user.

Also discussed is the effect on vendors. For example, in 1976 users spent \$190 million with RCS vendors for DBMS and DBMS-related products. This represents a growing share of the RCS dollar, which is, in itself, a growing portion of the total computer industry.

Similar Features

Amplifying on the similarity of vendor offerings, Sherman said all systems studied in the report are now "relatively easy" to generate and to use in a conversational English-like manner. They contain "fairly comprehensive" report generators and "relatively efficient" inverted or other types of indices, he added.

Most systems can now support multiple users and files and they have flexible searching and sorting capabilities. Accordingly, in the minds of the users, the major areas of differences between the systems is not in the features areas, but rather in more vendor-oriented areas such as:

- Honesty of marketing.
- Quality of support.
- Documentation.
- Vendor staff capability and availability.
- Price.

Analysis of survey responses makes it clear that no vendor has a definite focus on any target industry or functional area, the researchers noted. "It is our feeling, however," Sherman added, "that an increasing acceptance of DBMS by users is creating the development of more sophisticated systems and the gap between users and vendors is beginning to close."

This, we believe, is opening the door wide to vendors with an honest-to-goodness comprehensive, but still easy to use DBMS to make its mark on the RCS industry at this time," Info-Dyne said.

Cooperative Effort

This DBMS study was developed by and is continuing through efforts of the Info-Dyne consulting staff in cooperation with key RCS vendors and DBMS users. Major RCS vendors offering DBMS products were sent questionnaires to determine:

- The importance of DBMS to that company's overall financial and marketing position in the RCS industry.
- General characteristics as well as unique features of the company's DBMS products.
- Pricing strategy, billing capabilities and demonstrability.
- Marketing strategy and technical

support capabilities.

Operational characteristics relating to hardware capabilities for evaluation of throughput and turnaround efficiency.

Concurrently questionnaires were sent to large corporations and other DBMS users to determine their exposure to and experience with DBMS products already on the market. Questions related to the relative importance of the following factors in the procurement and use of DBMS products selected:

- The multitude of special features.
- Desirable characteristics of DBMS vendors.
- Pricing and billing considerations.
- Reaction to vendors' marketing techniques.

Future plans for DBMS usage and the areas of influence reflected in those plans.

The significant areas studied and features of the new report include a new section narrating a DBMS overview, the usage of a DBMS, the role of the data base administrator, Coadys's DBMS terminology and other DBMS terms, a DBMS language profile and the effect on controlled data processing experienced in the use of a good state-of-the-art DBMS.

Memory Utilization

The report also covers memory utilization of the system that supports the DBMS, general requirements to operate concurrently in core with other systems and programs, file and record size limitations and DBMS handling of multivolume situations involving the same file, techniques for indexing and searching for data, audit trail and rollback capabilities and the importance of archival backup files.

Numerous variations of pricing techniques (including the problems relating to unit pricing and fixed pricing) and pricing trends add recommendations are also discussed. Info-Dyne noted. In all aspects highlighted above, differences as well as similarities are discussed, according to Sherman.

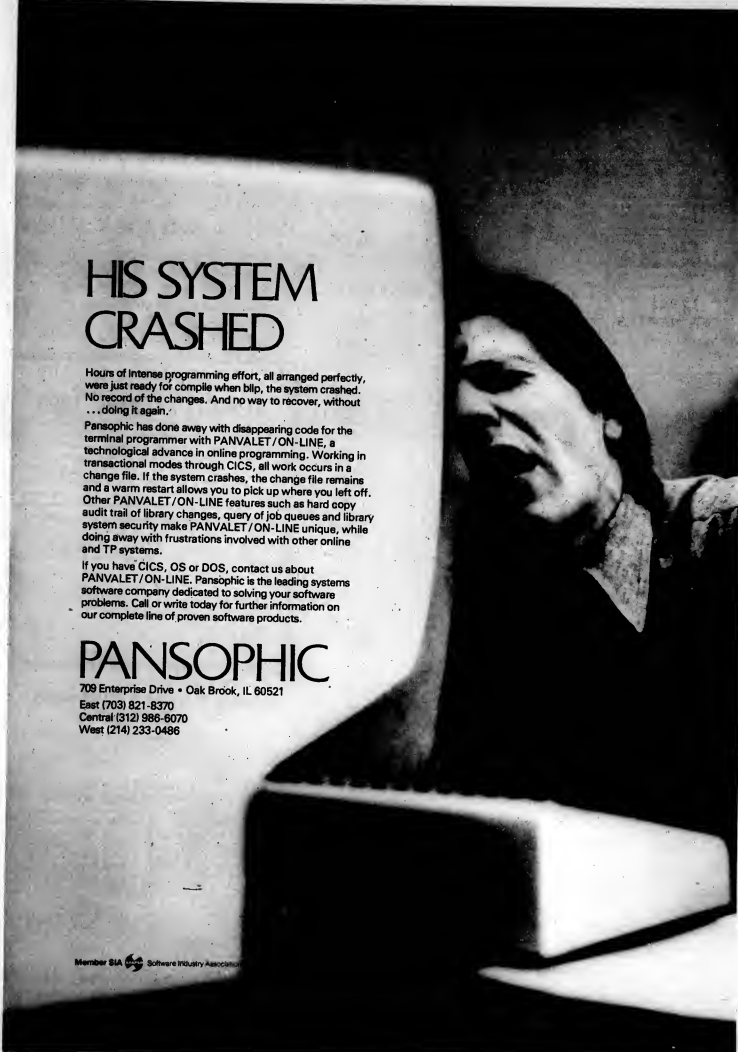
The Info-Dyne report includes a discussion of trends and observations of questionnaire responses. Included in this section are recommendations for vendors with respect to marketing and pricing strategies which should give them a highly competitive position. The report also includes 16 tables presenting a comparative analysis of the different areas covered.

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Fortran Subroutine Library

'Edition 6' Adds Eclipse Support

HOUSTON — International Mathematical & Statistical Libraries, Inc. (IMSL) has announced the release of Edition 6 of its Fortran subroutine library. In addition to new subroutines, Edition 6 includes a subset of the library for Data General Corp. minicomputer users.

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programs grouped into 16 categories. The 30 new routines are in the areas of random number generation, cluster analysis, regression analysis, differential equations and Bessel functions, according to the company.

The DG subset is said to include, "a major part" of the library and to be available for use on Eclipses under either AOS or RDOS. The library generally can be used on Burroughs, Control Data, Digital Equipment, Honeywell, IBM,

Univac and Xerox mainframes.

The library is available to mainframe users on a subscription basis for \$1,220/year with discounts offered for educational institutions and for multiyear contracts.

The package costs DG users \$1,220 for the first year, but \$750/year thereafter, an IMSL spokesman noted from the Sixth Floor, GNB Building, 7500 Bellaire, Houston, Texas 77036.

Package Eases Conversion

(Continued from Page 29) tirelessly with the ICL gear. ICL's stated plans to refuse engineering support to its System 4/50s after May 31, 1976 added to the pressure while personnel assignments to cope with degradation in performance of the ICL CPUs diluted the effort available for conversion.

Finally, the report noted, having the mainframes located 10 miles apart meant "there could be considerable communication difficulties" in making sure the programs and files were identical at both sites. And a company policy banning all overtime also had a negative impact on what could be done.

The conversion team recognized the complexity of IBM's Job Control Language would be the most time-consuming task it faced. Although the ICL 4/50 had a JCL it was incompatible with IBM's and the team knew it needed more help in solving this particular problem than in

nearly any other.

The team located the JOL package, marketed by Cetus in the UK (and by DASD Corp. of Chicago in the US), which was designed to generate correct JCL from a series of macro statements. JOL also includes checks for internal consistency of the job procedure it creates, warning the developer of any omissions or inaccuracies.

As one example of JOL's utility, the report said the user had to switch console messages on the ICL equipment to disk files on the IBM gear. Opening and closing these files "could easily have been overlooked in manual conversion," but the omission was spotted by JOL.

Testing time in computer hours was reduced by one-third and although that was a "book" saving, not a "real" one, in this user's setting, it impressed the author of the report.

He ended his report with a plea for the company to acquire the package permanently even though, at that time, there seemed to be a real concern on the amount of vendor support that would be available if they needed it.

Software Handles Insurance Agency

LEXINGTON, Mass. — An insurance agency management system designed to run on IBM 32s and 34s permits the user to enhance policyholder service and increase agency cash flow, according to the vendor, McCracken Computer, Inc.

Written in RPG-II, the package provides all monthly updates, statements, expiration listings, premium commission and account current reports, a spokesman noted.

The package should be easily adapted to other environments, the spokesman said. The package costs \$6,000 plus installation support, if needed. McCracken Computer is at 4 Millitia Drive, Lexington, Mass. 02173.

Service Schedules Fleets

ST. LOUIS — McDonnell Douglas Automation Co. (McAuto) is offering a fleet vehicle optimizing service on its nationwide time-sharing network. The service supports a CRT graphics terminal in the fleet scheduler's office for reviewing and fine-tuning the computer-generated routes, a spokesman noted.

The Interactive Vehicle Scheduling System (Ivess), developed by Decision Graphics of Nashville, will usually reduce the total mileage traveled on pickup, delivery and service routes by 5% to 25%, he said. This might lead to reductions in fleet size, he added.

McAuto can be reached through P.O. Box 516, St. Louis, Mo. 63166.

Package Aids Medical Bills

N. HOLLYWOOD, Calif. — The On-Line Patient Billing and Accounts Receivable (OL/PBAR) package, an interactive system for billing and insurance form preparation for doctors, dentists and clinics, is written in RPG-II. It requires 24K bytes of main

memory and 10M bytes of disk storage, is available for \$12,600 and is reportedly distributed in the user's choice of media.

The vendor is Occidental Computer Systems, Inc., 10202 Riverside Drive, N. Hollywood, Calif. 91602.

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Replaces Hard-Wired Controller

Processor Eases User's Net Expansion

HOUSTON — Bonner & Moore Computing Co., the service bureau division of Bonner & Moore Associates, Inc. here, has installed a programmable communications processor in place of its hard-wired controller to facilitate network expansion and enhance diagnostic capabilities for supervision and monitoring of the network.

Bonner & Moore provides remote job entry, time-sharing and batch processing for a

growing list of general business and scientific companies. Among its clients are several oil companies, a psychological testing service, a shipbuilding firm, a truck line and several construction companies.

The bureau's operating system is IBM's MVT with Hesp III, implemented on a 370/155 mainframe. A Xerox Sigma 7 CPU is also installed at the company's DP facility.

A Memorex Corp. 1380 processor handles

broadband transmissions between the two CPUs, as well as remote I/O devices in client facilities.

The 370 system was added in early 1976 to provide enhanced processing capacity, principally batch-oriented. The Sigma 7 handles most of the time-sharing, although time-share clients do have access to the 370 through the Sigma 7.

In the spring of 1977, Bonner & Moore replaced an older terminal controller with the 1380 processor in order to add more communications lines required by a growing volume of business.

Greater Versatility

According to Bonner & Moore's systems manager Robert Tomlinson, "As we added new communications lines, we reached a plateau where it became more cost-effective to go for the increased sophistication and capabilities of a programmable processor like Memorex's 1380. It easily accommodates new lines and, compared to other terminal controllers, gives us greater versatility in line troubleshooting and full communications processing."

The 1380 is a digital processor designed for data communications and real-time control. It operates as a front-end processor for up to four CPUs, controlling up to 216 communications lines.

(Continued on Page 38)

Paradyne Substitute for 3277 Works with PIX-II Systems

LARGO, Fla. — Paradyne Corp. has introduced an interactive CRT terminal, said to communicate with IBM 360/370 host mainframes on an attention interrupt basis without requiring polling messages from the mainframe.

The PIX-II VDU-77, an IBM 3277 equivalent, has been designed for use in small clustered applications with PIX-II "virtual data links." Previously the PIX-II system required use of the IBM 3277 CRT and its associated controller, but the VDU-77 allows PIX-II users to eliminate the need for the IBM terminal, according to a spokesman.

PIX-II systems consist of minicomputer-based local and remote control units which "extend" mainframe multiplexer channels to allow remote peripheral devices such as the VDU-77 to operate as if they were local.

The VDU-77 operates with control functions generated in the PIX controller, eliminating the need for a separate control unit, the spokesman said. The terminal can be installed in the field on operating systems with the addition of two circuit boards.

Elimination of the mainframe polling requirement reportedly reduces by 50% the number of discrete transactions involved in each exchange of data between a terminal and a host computer. One large user found 13% of CPU time on a 370/145 was consumed in processing negative polling responses, Paradyne said.

The VDU-77 features a 12-in., nonglare screen able to display up to 1,920 characters in 9 by 12 dot matrix patterns in both upper and lower case. The terminal can display a 96-character ASCII character set in either of two switch-selectable display modes: dark

characters on a light background or light on dark.

The terminal allows insertion or deletion of individual characters or full lines of screen text; full keyboard cursor control, including a "cursor home" key; tab and back tab keys; programmable function keys; and a numeric pad.

The CRT supports switch-selectable transmission speeds of 1,200-, 1,800-, 2,400-, 4,800- or 9,600 bit/sec over dial-up, private lines or satellite communications links when used with PIX-II virtual data links.

VDU-77 terminals add \$125/mo to PIX-II system prices. Paradyne is at 8550 Ulmerton Road, Largo, Fla. 33541.

Sycor 445 System Manages Distributed Data Entry and DP

ANN ARBOR, Mich. — Sycor, Inc. has introduced the 445 distributed data entry and processing system.

Hardware enhancements combined with software used in earlier devices make the 445 system well-suited for distributed processing applications, a spokesman said.

The 445 system will support up to 256,000 bytes of main memory; 70 million bytes of disk storage; eight 2,000-char. CRT terminals; and a combination of bidirectional matrix and line printers.

Networking Feature

For networking, Sycor has introduced Sycorlink, a feature that reportedly provides for the linking of multiple 445 processors.

The disk files on any system can be accessed by any other system in this network, Sycor said.

Sycorlink also allows any 445 in a network to share peripherals such as magnetic tape drives, printers and modems. Users can therefore increase their throughput, the number of keyboards in a network and the amount of on-line disk storage by adding additional 445s to the network, the firm added.

The 445 CRT incorporates a 15-in. screen housed in a desk-top unit that can be located up to 2,000 feet from the 445 processor.

The 445 utilizes a multiple-processor architecture to increase system throughput.

(Continued on Page 38)

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Sycor Has 445 for Distributed Data Entry, DP

(Continued from Page 37)

In addition to the main processor, additional processors are used in each peripheral controller, thereby freeing the main processor to carry on its chief function of processing data, Sycor said.

Five printer speeds are available with the 445 system. The Sycor Sprinter, a bidirectional, microprocessor-controlled matrix printer, operates at 60-, 120- or 180 char. sec and can be located up to 2,000 feet from the 445 processor. In addition, 300 and 600 line/min printers may be used.

A range of peripherals is available with the 445 including a built-in high-speed cartridge tape for disk backup and cassette, diskette and magnetic tape drives for interchange media.

The Sycor 445 offers bi-synchronous and Synchronous Data Link Control (SDLC) transmission modes at speeds up to 9,600 bit/sec.

Communications programs available on the 445 include interactive remote job entry; 440 batch transmission using various IBM protocols; Burroughs or CDC remote job entry; multitasking workstation support; and Sycor's Network Control System, which provides automatic polling and selection of remote 445s and other Sycor sys-

tems such as 340s, 350s or 440s.

Using Sycor's IBM 3270 emulator, the 445 can operate on-line to a host computer, thereby allowing access to files at the host computer, the company said.

Small offices may be equipped with a single data station to communicate with a 445 over telephone lines enabling them to get the power and resources of the system at a fraction of the cost. These remote stations will be supported by Cobol and Basic languages, according to Sycor.

Three programming languages are available on the Sycor 445 — Cobol, Basic and TAL 2000, developed by Sycor.

Using the firm's disk spooling reportedly eliminates "data traffic jams" at

peripheral devices and makes the entire DP operation flow smoothly. Multiple display stations can share a single printer or multiple printers.

Security of data on the 445 is controlled by a combination of hardware and software features:

- Optional keylock on each keyboard which allows the user to lock out all activity on the CRT.

- Program function key lockout, which allows the user to prohibit the use of certain keys thereby restricting the use of selected system facilities.

- System password protection which allows the user to specify the level of authority to use certain terminal command functions and to have access to certain disk files.

- Sycor's Guardian option which

automatically saves the contents of memory when power fails, then restores it when power returns.

- Sycor's cartridge tape drive for high-speed backup of disk files.

A typically configured 445 system incorporating 5 million bytes of disk memory, a 5 million-byte cartridge tape drive, 64,000 bytes of main memory, four CRT terminals, one Sprinter printer and a communications adapter can be purchased for \$60,300.

Comparable monthly lease rates are \$1,397, \$1,277 and \$1,156 for one, two and 3-1/2 years respectively, including maintenance.

Initial deliveries of the 445 are scheduled for the third quarter of 1978 from Sycor, Inc., 100 Phoenix Drive, Ann Arbor, Mich. 48104.

Processor Backs Expanding Net

(Continued from Page 37)

Through line interface buses connected to standard communications facilities and data sets, the 1380 can control switched and dedicated lines at speeds from 74.2- to 230,400 bit/sec. Memorex said. On operator command, the processor can also monitor, test and dynamically reroute lines among CPUs.

Various application programs can be switched among the CPUs without changing address codes, the vendor added.

At Bonner & Moore, the 1380 controls 16 lines ranging in speed from 2,000 bit/sec to 50 kbit/sec. The lines are a mix of dial-up and leased, serving clients in the Houston area and as far away as the Northwest and East Coast.

The company plans to add at least 20 more autospeed lines (normally 300 bit/sec) to handle IBM 2741-type terminals and Teletypes. Two of these lines have already been installed for testing.

When the company decided to add more RJE terminals to the system, according to Tomlinson, it ran into a limitation on the previous controller that would have required additional hardware. At that point, Memorex's 1380 processor was evaluated and eventually selected.

The 1380 also includes the advantages of a control console and CRT for handling line switching, troubleshooting and system monitoring, he said. Diagnostic and utility routines, carried on the processor's own flexible disk file, are brought to 1380 memory on call from any console.

This feature allows Bonner & Moore's computer operators to do their own communications troubleshooting. Through the console, diagnostics and communications checks can be run on- or off-line.



Small Modem

MIAMI — Racial-Milgo, Inc. has unveiled the CS 24 LSI central-site modem.

Because of its size, nine of the modems can fit on one shelf of a standard 19-in. rack, and 36 modems can fit in a standard 6-ft. equipment cabinet, the firm said.

The CS 24 LSI operates at 2,400 bit/sec. over unconditioned two-wire dial or four-wire private line point-to-point or multidrop circuits.

Standard features of the CS 24 LSI include a nine-LED display that provides indication of EIA interface signals and modem status.

The CS 24 LSI costs \$955 from Racial-Milgo at 8600 N.W. 41st St. Miami, Fla. 33166.

EFT Tests Start on Bankwire II

NEW YORK — The Bankwire network has initiated testing for Bankwire II, its nationwide electronic funds transfer (EFT) and message-switching system.

The initial tests involved communications between a switching center in Jersey City, N.J., and the Chase Manhattan Bank's central wire room in mid-Manhattan, using a DP interface at the bank and 2,400 bit/sec. Banknet/3 CRT terminals from Intecom Corp. at the switching center.

With the start of this testing, Bankwire is entering the final phases of a program leading to full cutover to Bankwire II operations starting next March. After that time, the 75 Bankwire I, which uses Model 28 teletypewriters, will be phased out.

The Bankwire, the banking industry-owned domestic EFT system, each day processes more than 20,000 payment messages — with a value in excess of

Terminal Transactions

\$20 billion — to provide funds transfer services to its 195 member banks. The Bankwire system is owned cooperatively by its users and is operated by Payment and Telecommunication Services Corp. and its parent company, Payment and Administrative Communications Corp. Bankwire II uses Collins Commercial Communications equipment at its

three concentrator points in Jersey City, Dallas, Texas, and Cedar Rapids, Iowa. Transmission between Jersey City and Dallas is at 9,600 bit/sec. using AT&T 209 data sets.

Messages sent to the Cedar Rapids concentrator are transmitted at 4,800 bit/sec. using Bell 208 data sets, a spokesman said.

During the first phase of the Bankwire II test program, called the user access phase, one of the dual-processor switching centers and all of the individual bank terminals communicating with the system will be installed and tested.

The second starting in March, will commence with live operation of Bankwire II and full cutover from Bankwire I. Bankwire II will incorporate new message facilities as well as interfaces with a wide range of terminals and users' computer systems.

When completed, the Bankwire II system will consist of two message-switching centers in Jersey City and Dallas operating in a dual-recording mode, in which every funds transfer message is recorded twice simultaneously.

Collins is the supplier of the switching center systems. Communications lines are being provided by AT&T. The low-speed Banknet/1, and Banknet/2 terminals used in the system are Model 33 teletypewriters and Terminate 300s provided by Western Union Data Services, and the CRT higher speed 2,400 bit/sec. Banknet/3 and Banknet/4 terminals are from Intecom. Individual banks are also directly interfacing DP systems to the new Bankwire II network.

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Tektronix Offers CRT Camera

BEAVERTON, Ore. — A CRT camera that features an electric shutter and changeable magnification is available from Tektronix, Inc.

The C-28 camera's electric shutter also remote operation of the unit and also provides accurate repeatable exposure times, the firm claimed.

Two film backs are supplied with the C-28. The first is a Graflok 4-by-5-in. roll film back and the second is a Polaroid 405-type back modified to fit directly onto the Graflok back.

Power requirements for the unit are 15 Vdc which can be supplied by a calculator-type ac-dc converter.

Price of the C-28 camera is \$1,085. Tektronix is at P.O. Box 500, Beaverton, Ore. 97077.

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Trendata Has Flexible Disk Unit

SUNNYVALE, Calif. — Trendata Corp. has unveiled its Model 500 flexible disk system (FDS) to operate with its terminals.

The Model 500 FDS is a communications-oriented mass data storage unit using IBM-compatible flexible diskettes.

The front control panel of the unit includes a power-on switch and four indicator lights, the firm said. The FDS is designed for use

as a 240K-byte random-access peripheral to the Trendata Model 4000A and Model 300 Trendwriter terminals. The FDS also provides communication capability to and from a remote computer in user-selectable rates of 50- to 9,600 bit/sec, the firm said.

The standard Model 500 FDS is equipped with an edit package using a "scratch pad" that does not affect main storage unless desired by the operator. One or more lines of

data may be deleted, replaced or inserted in a record and new information may also be added to a record. Character string searches are possible, enabling editing within a specific line or multiple lines of data, the company said.

Communication with a remote location may be operator-initiated or performed in an unattended mode via an auto-answer/auto-disconnect feature. Data sent or received need not be printed during transmission.

The basic 500 FDS costs \$3,995, which includes a standard Trendata warranty. An auxiliary printer port is available for \$750. Leases start at \$125/mo. including maintenance. Delivery of standard units is 30 days from Trendata, 610 Palomar Ave., Sunnyvale, Calif. 94086.

Most graphics terminals are too dumb for words.

Even expensive models get tongue-tied when it comes to alphanumeric. But now there's a bright new graphics terminal that has all to say for itself.

Alpha-graphics: the perfect combination.

It's the Hewlett-Packard 2648A alpha-graphics terminal. For just \$5500*, it will dazzle you with a



virtuoso display. You'll see zoom and pan, area shading, pattern definition, rubber band line, scientific plotting and graphics text composition. Having independent memories for graphics and alphanumeric, you can do auto-plots with or without words and figures on the screen.

And when you need a smart alphanumeric terminal for on or off-line work, stay right where you are.

How smart is smart?

Ever seen a graphics terminal scroll 200 lines of interactive dialogue? And store up to 220K bytes of data (words and pictures) on twin cartridges? And cut out repetitive routines by storing up to 80 characters on each of eight "soft keys"?

The HP 2648A can also edit with the best of them. Communicate with a computer at rates up to 9600

baud. And accept a plug-in forms drawing mode to generate just about any form your company uses.



Strong as well as intelligent.

Like all our terminals, the HP 2648A has a clean, tough, modular design. Open it up like a suitcase, and you'll see the neat row of plug-in PC boards.

That makes it easy to add options or take care of maintenance. Not that downtime is a problem. Our terminals have such a good track record that we've lowered our maintenance price three times in the past two years. When you do need service, more than 1000 Systems and Customer Engineers worldwide are ready to take care of you. So why settle for any dumb graphics terminal when ours can figure in your picture?

See for yourself by calling the Hewlett-Packard office listed in the White Pages. Or send us the coupon and give our 2648A alpha-graphics terminal a screen test.



Yes, give me the good words (and pictures) on the HP 2648A terminal.

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Hewlett-Packard Data Terminal Division,
19400 Homestead Road, Dept. 314, Cupertino, CA 95014.

*U.S. domestic price

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Delta Data Unveils CRT

CORNWELLS HEIGHTS, Pa. — Delta Data Systems Corp. has announced a CRT terminal for U.S. users that sells for \$1,795.

The Model 4100 terminal comes with editing capability, format capability (protected field) and 128 displayable upper and lower case characters. Transmission rates can be switched from 110- to 9,600-bit/sec and is available in asynchronous or synchronous mode.

Other features include full text editing capability and a 2,000-char. refresh memory that may have the data packed to allow storage of up to 125 lines of data at the terminal at one time.

Cursor manipulation is standard in terms of addressable and readable cursor as is the ability to scroll through the data in an up-and-down mode. Printer output and remote monitor drive are also standard.

The unit is available immediately from Delta Data Systems Corp., Woodhaven Industrial Park, Cornwells Heights, Pa. 19020.

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Covers Legal, Technical Aspects Be Specific, Guide to Contracts Advises

By Tim Scannell
CW Staff

MANCHESTER, England — "The drawing up of a contract for the acquisition of a computer and associated services (hardware, software, maintenance, training), has implications which can affect both installation and subsequent computer operations," according to a guide released here by the National Computer Centre Ltd.

Computerguide 12, Computer Installation Contracts, begins by describing contracts as one of the most important aspects to consider in purchasing both the computer and its related equipment. The contract "is therefore of concern both to users and suppliers, particularly for DP managers who are closely involved operationally and will bear the brunt of any problems," the guide states.

The guide, although based on English law, attempts to deal with many of the basic points to look for when formulating a DP contract. "It is," however, "intended only for matters which need to be borne in mind, and not as a definitive textbook."

The guide's two sections deal with technical and legal considerations respectively.

"Technical considerations refer to the computer installation itself — the environment in which it operates, its hardware, software, support services — from a contractual viewpoint and for a successful installation," it says.

The guide notes that all equipment characteristics must be specified in detail within the contractual arrangement. Features such as the weights of both packed and unpacked units and equipment dimensions such as "cable length which may impose constraints on equipment siting... and the amount of heat dissipated from units, both individually and collectively," must be listed.

Floor Limitations

The contract should outline structural limitations of the floor, the guide explained. This would include whether spreaders are needed and provisions for equipment mobility.

"Requirements for a raised floor should be defined," the guide advises, "with information on siting, the position and number of access points, support structures, flooring materials" and the like. "Information should also be included on door widths, lifts, hatches and storage areas for consumable materials and maintenance tools/equip-

ment."

In dealing with security and protection, the guide instructs that "provisions to cope with possible hazards should be specified," such as "the effects of fire, flooding, explosion or acts of malice... The characteristics of automatic fire detection and prevention equipment should be included" like "warning systems and emergency cut-out facilities" and fireproof cabinets. Also, "provisions to counter unauthorized personnel access should be defined," it urges.

Hardware compatibility must be covered

when authoring a contract, the guide said. If the units can be physically linked or share the same software, that must also be listed in the document. "Any previous use of the equipment should be made clear, with details of ownership, history and other relevant information. Data relating to the relevance of the current system should also be included."

Other hardware considerations should include the possibility of system expansion with regard to CPU size, the availability of (Continued on Page 46)

Chain's Credit Authorization Streamlined by POS System

By Jeffrey Beeler
CW Staff

COLUMBUS, Ohio — A chain of 10 retail specialty stores headquartered here has streamlined its credit authorization procedure following the installation of a point-of-sale (POS) system that serves both on-line and remote-batch applications.

For the Union Co., which operates stores both here and in the Youngstown, Ohio, areas, this greater efficiency means increased throughput at the checkout counters and improved customer service, according to Susan Gould, one of the chain's systems programmers. Gould admitted, however, exactly how much the installation has improved checkout counter operations until the end of the Christmas season.

She also credited the POS system with accessing stored data at least 50% faster than Union's previous computer system. This increased operating speed has allowed the store chain to boost its batch job efficiency by about 10%, Gould added.

Before it installed its current configuration, Union performed its remote-batch tasks, which include the standard accounting functions like accounts receivable, inventory control and payroll, with a system built around an NCR Corp. Century 200 CPU.

At the same time, the company performed its credit authorization by telephone. Whenever someone attempted to buy an item whose price exceeded a set amount, cashiers at the checkout counters had to call a central office to check the customer's

credit rating and authorize the purchase, Gould recalled.

Need for Larger Memory

For a while, both the off-line communications system and the earlier remote-batch system worked satisfactorily enough. But when store officials decided to add four new outlets to their chain, they realized they would need to enlarge their CPU's main memory capacity to accommodate the resulting growth in the company's DP workload, Gould explained.

The earlier Century 200 system held only 32K bytes of main memory, she said.

Store officials also recognized the potential for improved operations in their previous credit-authorization procedure, Gould added.

To overcome these problems, Union executives decided to replace their earlier computer system with a newer configuration that could provide both a larger main memory and an on-line DP capability.

During the ensuing hardware search, the officials recognized that any equipment they installed would have to be supplied by NCR. If an alternative system had come from any other vendor, a lengthy and costly software conversion process would almost certainly have followed. Union's controller William Quinn said.

At first, the chain considered installing a Century 151 system, but later officials rejected that option when they concluded that NCR had begun to phase out its Cen-

(Continued on Page 42)

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SALES AND MAINTENANCE OFFICES THROUGHOUT THE US AND CANADA

Retailers POS System Speeds Credit Checks

(Continued from Page 41)
 tury line of hardware, Gould recalled. Instead, the company opted for a member of a newer NCR product line — a Criterion 8550 computer system.

Prime Considerations

Cost and operating speed were the most important considerations in Union's choice of the 8550 over rival systems, Gould explained. After evaluating several equipment alternatives, company executives concluded they could install the 8550 for about \$1,000/mo less than the cost of upgrading their existing computer, Quinn estimated.

With this economic advantage in mind, the store chain began installing the 8550 system last February. Within

two weeks, the configuration had become fully operational, Gould said.

During that transitional phase, Union officials encountered a few installation difficulties, but for the most part they proved relatively minor, she added. "We had some problems getting our trunks worked out properly and getting the multiprocessor system to work properly," Gould recalled. But otherwise, the installation went fairly smoothly.

Besides the CPU itself, the system incorporates a printer and two NCR 658 disk units with a combined capacity of 200 million bytes.

In June, the company also began installing the first of its anticipated 70 NCR 280 retail terminals at its various outlets. To date, the firm has equipped

all its stores with the terminals, except for four sites in Youngstown, Gould said.

Since it installed the current system, Union has quadrupled its main memory size to 28K bytes. Thus far, this increased capacity has not significantly benefited the chain's operations, despite the 10% jump in batch processing speed, Gould admitted.

"Even if [the new system] were slower than the old one, we'd still have plenty of time to run our batch jobs in the 14 hours per day we operate our computer," she explained.

But as the firm upgrades and expands its current system, this larger memory size will become increasingly important, she added.

The increased capacity has also al-

lowed the chain to automate its credit authorization, in sharp contrast to the way the function was performed before, Gould said. As a result, Union's cashiers now have to make "far fewer" calls to the credit office than before and can provide each customer with a machine-generated sales receipt listing each item purchased, its price, list and other merchandising information, she added.

Stor/135 Gets 'Power-Up' Aid

BEDFORD, Mass. — Cambridge Memories, Inc. has announced an automatic power-up feature for its 370/Stor 135 add-on memories for IBM 370/135s.

This feature, which is included at no cost with the Stor/135, permits users of IBM 3135 processors to perform on-line initial microprogram loading to the mainframe system without the need to switch the memory off-line, the firm said.

The complete Stor/135 system has error-correction circuitry that detects and corrects all single-bit errors automatically plus a reconfiguration switch that permits the operator to switch out any 64K-byte sector of memory from the total systems operation. In addition, an off-line switch enables failed memory sectors to be removed from the system, a spokesman claimed.

A typical 256K-byte system added on to a resident 96K-byte memory has a purchase price of \$85,000 or a monthly lease price of \$2,000 with maintenance additional from Cambridge Memories, Inc., 12 Crosby Drive, Bedford, Mass. 01730.

Devoe Carrier Holds Floppy Disk Files

PALO ALTO, Calif. — A floppy disk file carrier made of rigid vinyl with see-through front pockets was introduced by the Devoe Co.

The carriers can be filed in a standard letter-size cabinet, transferred to an oversize three-ring binder or transported in a locked carrying case. A subject reference card and a label for the top index tab are included with each carrier.

The carriers sell for \$1.18 in quantities of one to 10 from the Devoe Co., 3788 Fabian Way, Palo Alto, Calif. 94303.

The Versatile Generation.

Infoton's new generation of low price terminals does it all. The incredibly versatile 200 and 400 give you a choice of options unmatched in the industry.

Model 200 is a beautiful example. It is a Teletype compatible terminal with roll or page mode of operation. A detachable keyboard of solid state construction guarantees 100 million operations... ten times the performance of most mechanical keyboards. And the keyboard comes in five different configurations plus export versions to suit users' unique requirements. Other outstanding features include 9 x 9 dot matrix, addressable cursor, EIA and current loop interfaces and non-destructive forward and back spacing.

The 400 has everything the 200 has... and more. Built around the Z-80 microprocessor, it allows software designers to expand programs as needed without additional hardware. Capabilities include complete formatting and editing with block mode transmission. Also character mode for normal log-in procedures or straight character operation.

Last but not least. Both the 200 and 400 have prices among the lowest in the industry. Only \$795 and \$1095 respectively in quantities of 100. Write or call for full details.



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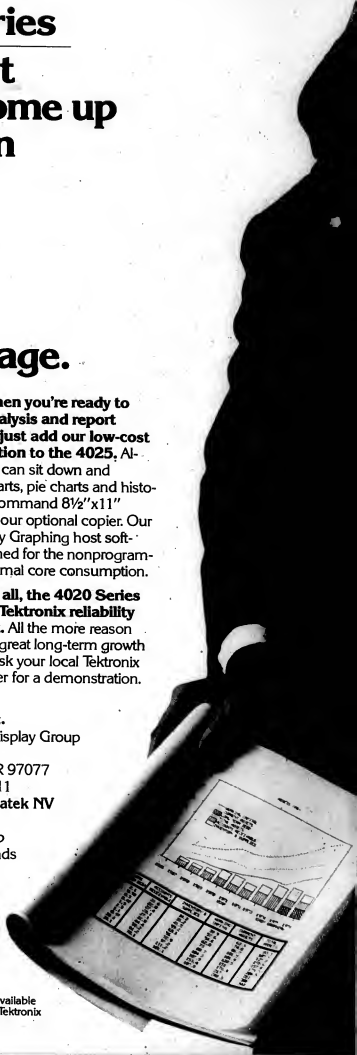
Begin with the basics: alphanumerics at its best. Both configurations include expandable memory. Complete editing. Fields. Scrolling. Familiar, user-definable keyboard. Easy-on-the-eyes screen.

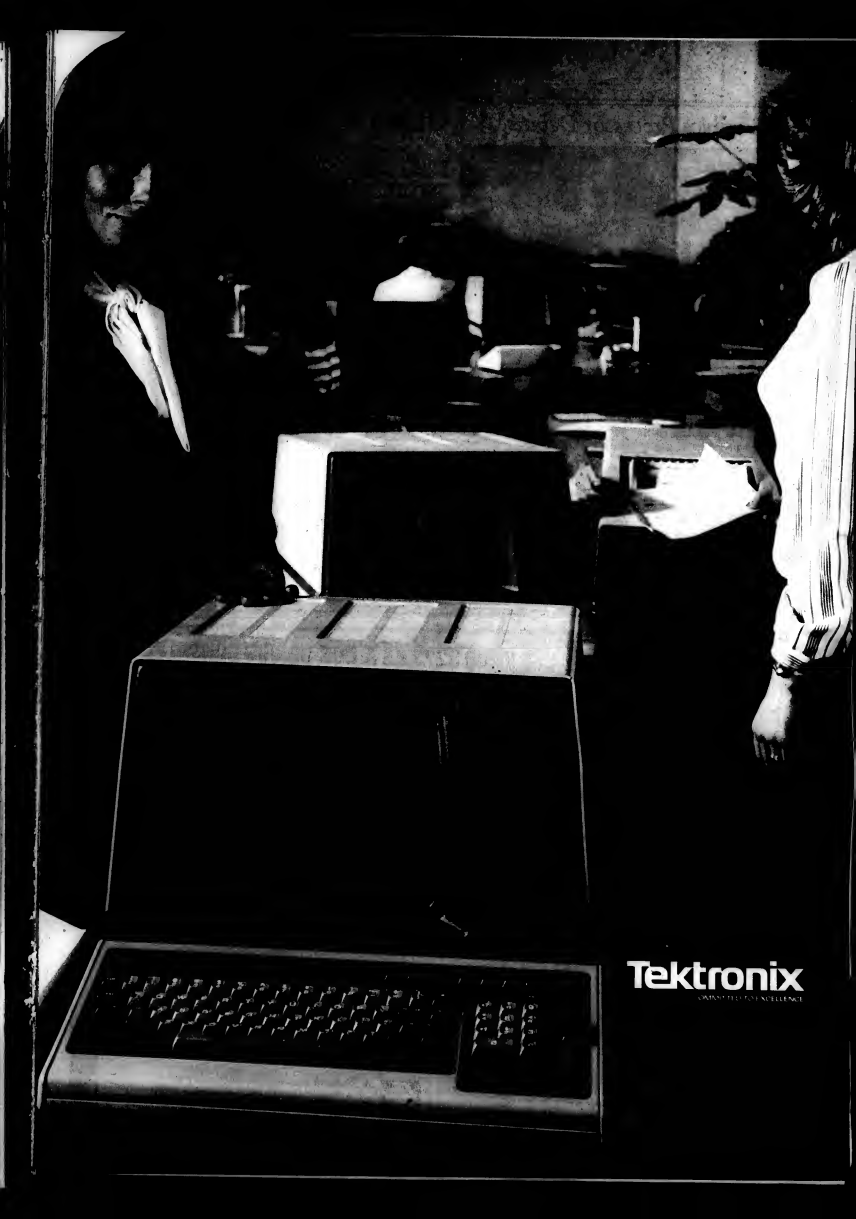
Plug in the forms ruling option and either terminal can recreate just about any source document. With one keystroke entry. Easy information call-up. Ideally proportioned 34-line deep screen.

And when you're ready to add data analysis and report generation, just add our low-cost graphics option to the 4025. Almost anyone can sit down and create bar charts, pie charts and histograms, and command 8½"x11" facsimiles off our optional copier. Our PLOT 10 Easy Graphing host software is designed for the nonprogrammer. For minimal core consumption.

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Graphics Processor Debuts



Shown here is Computervision Corp.'s Designer system with CGP-100 graphics processor.

BEDFORD, Mass. — The Computervision Corp. has introduced a graphics processor designed to be used in conjunction with its Designer system for computer-aided design and manufacturing applications.

The CGP-100 features a memory that is field-expandable to 512K words of 16-bit memory and it operates on a 90-amp power supply, the firm said. It also has a push-button automatic program load capability with built-in diagnostics to enhance data integrity.

The Designer system, along with the CGP-100, can be used to automate the design, drafting and manufacturing process in applications such as mechanical design and drafting, numerically controlled manufacturing, printed circuit board design, schematic creation, integrated circuit design, wiring diagrams, piping schematics and map production, a spokesman added.

Prices of the Designer system, which

includes the CGP-100, begin at \$125,000 from the firm at 201 Burlington Road, Bedford, Mass. 01730.

Data Technology Has Flatbed Drafting Unit

WOBBURN, Mass. — A flatbed drafting plotter, compatible with digital data sources that can accommodate an incremental or RS-232C interface, was announced by Data Technology, Inc. The 3454 Series plotter operates at up to 16 in./sec and is accurate to approximately .004 inches. It has a 34-in. by 54-in. flat work area that tilts and can accommodate drawings up to "E" size.

The basic drafting unit, which includes a drive, digital servo control, incremental input and two-pen holder, is priced at \$15,900 from Data Technology, Inc., 4 Gill St., Woburn, Mass. 01801.

Guide Discusses Contracts

(Continued from Page 41)

extra facilities, number of possible peripherals and the time it would take to effect a change.

Consumable materials should also be listed such as punched cards, printer ribbons and paper and stationery. "The user should consider the possible effects on the performance of the system of using nonapproved expendable items such as magnetic tapes, disks or punched cards" and whether or not he is liable for damages incurred by their use.

Then, of course, there are such aspects as software and its maintenance, support services like training, program and file conversions, standby facilities, manuals and documentation. All of these should be made clear before a contract is signed, the guide states.

Legal Considerations

The section on legal considerations "has been written . . . so that the reader may gain some appreciation of the kind of legal detail to be considered in any contractual arrangement" involving computers.

Aside from the obvious inclusions such as the names of the parties involved, prices and delivery dates, there are other things that should be considered in the contract, the guide states.

If a contract specifies that the vendor is not liable for damage from misuse, "the user should check that the purpose for which the equipment is to be used does not itself amount to a misuse and should ask for a list of obvious misuses." The user should ensure

"that the use to which the equipment is to be put is fully specified, that according to its specifications the equipment is capable of fulfilling its intended purpose."

Time limits on legal actions and limits of liabilities should also be listed and "the user should consider the possible effects on the performance of the system of using nonapproved expendable items such as magnetic tapes, disks or punched cards" and whether or not he is liable for damages incurred by their use.

Terms of cancellation or termination of the contract should be spelled out in the document. Such consequences as failure to deliver, damaged equipment or defaulting on an agreement should be listed as reasons to cancel the contract.

"The contract should call for parties to exercise reasonable care in dealing with confidential information" regarding user manuals, equipment specifications, prices or facts relating to a user's business. "Any disclosure which occurs . . . may not be actionable but there may be an obligation to require third parties to enter into similar undertakings as to confidentiality before making otherwise authorized disclosure to them."

Finally, the guide advises that the contract should include procedures to be followed in the event of a dispute, including whether settlement will be through arbitration or the courts.

The book costs \$3.44 and is available in the U.S. from the Hayden Book Co., Rochelle Park, N.J.

WITH DOCS USE YOUR 3277 AS A DOS-DOS/VS CONSOLE!

DOCS—Display Operator Console Support—provides the IBM S/360 & S/370 DOS and DOS/VS user with 3277 display unit SYSLOG support. DOCS is simply installed on any DOS or DOS/VS system with no changes required by the user. All 1052, 3210 and 3215 typewriter functions are supported by DOCS with numerous enhancements over a non-DOCS environment. DOCS also enhances DOS/VS operation on S/370, 138, 148, and 158 beyond that provided by the IBM program product. DOCS is quickly and simply installed on any system. All that the user need do is catalog the DOCS distribution tape to his Core Image library, define where the DOCS hard copy file is to be located and execute DOCS. Total installation time required is under 10 minutes. DOCS functions concurrently with EDOS, GRASP, DOS/MVT, DOS/RS, POWER II, ASAP, POWER/VS, and ITEL's DOS/VS executing on a S/360 and will enhance the system operation by providing improved facilities for the use of these packages while DOCS is controlling SYSLOG. DOCS is currently used in over 250 installations worldwide including diverse businesses and US Army bases. DOCS is available from C.F.S. Inc. as a licensed program product and may be leased monthly, yearly or on a one-time lease arrangement for \$175.00, \$1,890.00 and \$5,670.00 respectively. All three lease plans include free maintenance for as long as DOCS is installed.

SPEED

DOCS provides significant throughput improvement by the very nature of the speed of the 3277 display unit alone. Operators can even pre-answer messages on the console.

MULTIPLE CONSOLES

DOCS allows from 1 to 16 3277 display unit consoles to be used simultaneously as SYSLOG devices.

MULTIPLE OUTSTANDING REPLIES

DOCS permits messages followed by Reads to the typewriter to remain unanswered without tying up the system. All outstanding Reads are shown in high intensity on the display console(s).

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DOCS does away with any need for the Console Buffering option in DOS or DOS/VS thus providing a savings in the core required by the users' supervisor as well as greatly reducing significant overhead to the entire system. Experience has shown that total throughput improvement with DOCS installed may approach 10% to 20%.

Send requests for DOCS to C.F.S. License agreements along with detailed information will be sent by return mail. Inquiries may be directed to:

ELIMINATES DEPENDENCY ON TYPEWRITER

DOCS will continue to operate, and allow the entire system to operate, if the 1052, 3210 and 3215 typewriter becomes inoperable. DOCS spools all typewriter data to a hard copy disk file for later printing thus obviating the need for the typewriter to be on-line at all times. Hard copy is asynchronously provided if the 1052, 3210 and 3215 is available. A hard copy listing is also available through a utility program which the user may execute in any problem program partition to list the hard copy file on SYSLIST.

NO USER PARTITION REQUIREMENT

DOCS executes in its own pseudo-partition thus allowing the user unrestricted use of the problem program partitions.

MULTIPLE EXTERNAL INTERRUPT KEYS

DOCS provides a separate External Interrupt key for each partition (replacing the use of the MRC command). This is especially convenient for EDOS users. This function is also useful for GRASP users when communicating with a background partition problem program. A unique interrupt key is provided for each DOS/MVT region.



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C.F.S. Inc., P.O. Box 662, Brookline, MA 02147
(617) 731-3474 Telex 94-0285

Auerbach: 16-Bit Era Not Over

By Esther Surden
CW Staff

PENNSAUKEN, N.J. — The introduction of Digital Equipment Corp's 32-bit VAX-11/780 did not "signal an end to the era of the 16-bit minicomputer." Instead, it represents an "evolutionary extension of Digital's popular PDP-11 series of minicomputers" and "offers several methods by which compatibility links can be established with the PDP-11 series," according to a special Hotline report from Auerbach Publishers, Inc.

The report noted that DEC did not introduce much business-oriented software to take advantage of the 32-bit features of its mini and that not all of the system's internal buses have 32-bit data paths.

The system is "still in the initial stages of its development," the Auerbach report contended, adding "the bulk of the unfinished development work appears to be in the software area."

For example, "language support for VAX is still in the formative stages, the report pointed out." In support of VAX's "time-critical orientation" and its users who will probably be running scientific, computational and simulation applications, DEC has released "a Fortran IV-Plus that takes full advantage of VAX's 32-bit architecture."

"All other languages, Basic-Plus-2, Cobol-74 and Macro, run on VAX in a 16-bit emulation mode," the research organization noted.

No 32-bit mode software for the commercial user has been announced, and there are "no hints of support for Digital's commercial language, Dibase. Also, there is currently no record or file management software or data base management software," Auerbach found.

The VAX system is compatible with "the most popular" PDP-11 operating system, RSX-11, in either M or S ver-

sions, the report continued. "A package called the Application Migration Executive allows RSX-11 programs with non-privileged instructions to run on VAX 11/780 under VAX/VMS."

The system's architecture seems to be similar to that of the PDP-11/70. However, VAX-11/780 has three buses.

Two of these are the familiar Unibus and Mibus used on the PDP-11/70. Both of these are 16 bits wide and support standard PDP-11 peripherals.

The third bus, called the Synchronous Backplane Interface, has a bandwidth rate of 13.3M byte/sec. It is 32 bits wide and serves as the main data path, the researchers said.

The VAX-11/780 system report is designated No. 180.3451.150 and is available as part of the Auerbach Minicomputer Reports. It costs \$10 from the company at 6560 N. Park Drive, Pennsauken, N.J. 08109.

Minis Mean Control for Broker's Broker

By Ann Dooley
CW Staff

NEW YORK — Working with thousands of different numbers, hundreds of different clients, 76 CRTs and two minicomputers, J.J. Kenny Co., Inc., a municipal bond brokerage firm, provides the critical link between buyer and seller in the secondary bonds market.

Referring to itself as "the broker's broker," the company provides municipal bond information within five minutes to dealers and dealer banks with its automated system.

J.J. Kenny has two Digital Scientific Corp. Meta 4 minicomputers, which emulate the IBM 1130. They are linked to Computer Communications, Inc. (CCI) CRTs at each trader's desk.

The company is so enthusiastic about its computerized operations, there are 76 CRTs for its 86 employees scattered around the headquarters building, according to Richard Donnelly, vice-president and secretary.

As a municipal bond bid comes in over the telephone to a trader, he types in all the necessary information on the CRT. The CRT then displays all the daily bids available according to their declining dollar amount.

The client decides when the best price is reached and sells to the highest bidder if he wishes to. The system records, stores and invoices all the information.

The transaction is completed and the system work is ended when the bonds are delivered and paid for, Donnelly explained. J.J. Kenny never sees the actual bond, but

only works as the intermediary between the buyer and seller in conjunction with a clearing agent, according to Donnelly.

The system was designed to handle the constant flow of information. After the bid wanted item is taken via the telephone, the trader rechecks a description of the item for accuracy and it is input to the CRT, which transmits it over the firm's private teletype system reaching 87 cities.

Once the item goes over the system, traders at J.J. Kenny wait for the calls to start coming in. Within several hours of the start of

business one day, J.J. Kenny already had received 673 bids worth \$25 million on file and transacted 17 bids worth \$3.2 million; the system had been accessed by traders 6,441 times.

On an average day, the company handles \$40 million to \$60 million worth of bonds.

The public is not told who sells the bonds or who buys them since the company maintains a strict sealed bid policy, officials said.

The system has the ability to work in three modes — yesterday, today and tomorrow, (Continued on Page 50)

Clearinghouse System Keeps Egg-Trading Operation Rolling

By John G. Stephenson
Special to CW

DURHAM, N.H. — A minicomputer has taken over many of the trading chores at the commercial egg-trading center for the U.S. A custom software system lists bids and offers to buy or sell eggs, matches bids and offers and handles billing and bookkeeping.

The Egg Clearinghouse, Inc. (ECI) operates from a modest office in this New Hampshire college town. Yet last year alone the eight-man staff traded over 300 million eggs with a value of \$17 million.

Each day the clearinghouse handles calls from many of its 270 producers and buyers. Ray Delano, ECI president, wanted a system that would take most of the manual tabulation and calculations out of the egg-trading

process.

The ECI system includes a file containing an identifying code for each trader. At the start of trading, a trader phones in, gives his identification and enters his bid or offer.

The system notes the location of each buyer and seller and figures the freight cost between every possible combination of buyers and sellers. It allows for this freight difference when it tries to match bids and offers and make trades.

If the system finds no trades, the mini lists the next best trade for each of the buyers and sellers. Traders can use this information to make price adjustments.

Data on each trade goes into an invoice file. Then the system prints a three-part (Continued on Page 50)

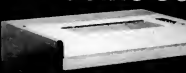
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3270/3790 Users: Why wait for 3274s or 3276s? Raytheon's PTS/1200, the highly does much more. And you can get it

Waiting for the next new product advance can often make a lot of sense. Unless there is an immediately available alternative that has far more capabilities and can produce far greater cost savings and productivity benefits.

Raytheon's PTS/1200 system is such a product. It is a fully-programmable distributed processing system that uses an easy-to-use English-language compiler, has a main memory capacity of up to 128K bytes, handles up to 32 operator displays—plus dozens of additional downline displays in a multipoint network control mode—and can have a large peripheral equipment complement and local data base as well.

And the PTS/1200 operates in a fully compatible mode with IBM 3270 operator display devices. It not only emulates every 3270 function, but it performs total batch processing and spooling functions as well—simultaneously—and with no degradation in response times in either interactive or batch mode.

If you are waiting for the next 3270-type product to come on the market, wait no longer. For the PTS/1200 is far more powerful, cost efficient and adaptable—in a 3270 environment—than any product you can find today. And you can take delivery in just 30 days.

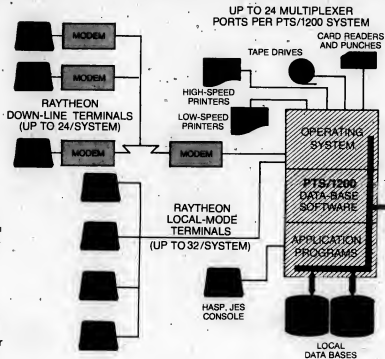
Look at what else the PTS/1200 can do for you:

- ✓ Operate in full 3270-compatible mode
- ✓ Control up to 32 operator displays
- ✓ Perform local batch processing concurrently with 3270 interactive processing
- ✓ Attach up to 24 peripheral devices
- ✓ Attach a large local data base
- ✓ Perform all 3270-type data entry tasks
- ✓ Perform all 3270-type inquiry/response tasks
- ✓ Operate as a HASP/JES workstation at the same time it is performing 3270 emulation
- ✓ Perform multiprogramming functions
- ✓ Control, in addition, a multipoint network of up to 24 terminals in 3270 mode.

Consider these five benefits, and you'll look a lot harder at the PTS/1200:

1. No Change To Host Processor

The PTS/1200 installs immediately within your existing network with no change required in your host CPU, in the 370X front-end, in your existing applications software, or in your Emulation Program. It goes to work under 3270 bisynch protocol the day you install it.



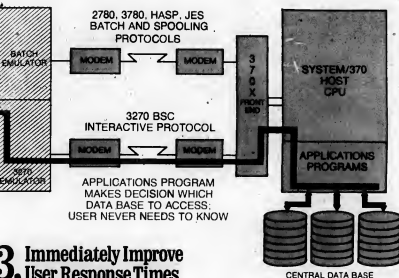
2. Cut Mainframe Overhead

The enormous power of the PTS/1200 permits you to develop and store local formats and perform advanced data editing prior to transmission to the host CPU. This one feature alone can reduce your mainframe overhead by 30 per cent or more. The PTS/1200, in addition, runs its own multipoint network of up to 24 Raytheon terminals in 3270 mode—saving even more CPU time.

Intelligent terminal system, t in just 30 days.

4. Reduce Communications Line Loading

With the PTS/1200, you perform a high percentage of the data entry and inquiry functions of a 3270 locally. In many cases, that can eliminate up to 90 per cent of the wasted communications overheads involved in polling, ACKing and NACKing, and in retransmitting. Your system becomes much more efficient in its use of communications lines.



3. Immediately Improve User Response Times

The busy times that often degrade each operator's response time from the host CPU disappear when you install a PTS/1200. Instead of operator waits of 20 or even 30 seconds when the network is busy, with the PTS/1200 the response is instantaneous for every operator, with every transaction. Multiply the number of operator stations by the number of messages by the average degradation delay and you get some feel for the productivity advantages that the PTS/1200's local format and data base storage features offer you.

- ☐ Tell me more about the PTS/1200. I am currently planning to develop _____ 3270-type links, with about _____ terminals, using Model _____ mainframe equipment.
- ☐ I need immediate delivery of _____ 3270 emulation terminals. Tell me how fast I can get them. We'll talk about PTS/1200 features later.
- Name: _____
- Title: _____
- Company: _____
- Street: _____
- City: _____
- State: _____ ZIP: _____
- ☐ I'm also interested in _____
- _____ PTS-100 intelligent terminals
 - _____ Raytheon's packet network systems
 - _____ Your New OEM/Dealer Support program

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RAYTHEON

Dual Minis Bring Control for Broker's Broker

(Continued from Page 47)

according to Donnelly. The complete bidding and sales of the previous day can be called up and tomorrow's program can be readied while work on the present day's bid is being done, he said.

The system relieves the trader of detail so he can handle other business, cover accounts better, handle more calls, obtain a wider range of information and avoid number-crunching problems, Donnelly said.

Using this method, the trader has more time to handle the negotiations between buyer and seller, he added.

J.J. Kenny's primary work consists of handling the bid wanted items and the active trading market.

The company keeps three minicom-

puter systems in-house, two in its DP center and one in its subsidiary Municipal Security Evaluation Service (MSES). Both companies have real-time, data base-oriented systems.

Previously, J.J. Kenny used an IBM 1130 system, but because of the company growth needed faster throughput. In 1971, it converted from batch processing to CRTs and then went to real time, ordering its first Meta 4 to emulate the 1130, Donnelly said.

The company did several benchmark tests before buying the Meta 4s, but was most pleased with that system's performance, he added. Many other systems were still in the development stage at that time, he recalled.

The company also upgraded to on-line communications, added disks,

firmware and software. It can keep adding terminals without a decrease in throughput, he said.

The bid information that is input into the CRT includes the time the trade took place, where the bid was taken, which trader took it, the bond description, the owner, the percentage yield and concession.

Other information includes when the date of the bond will mature, the region it's from, state and interest rate.

The daily list of municipal bond offerings is stored on disk for fast availability. The system also stores information on blocks of bonds for the bond yield and its dollar equivalent.

The system can also scan all available resources to find the bond that fits a specific inquiry, Donnelly said.

After trading has stopped for the day, the system continues to work to confirm and verify all the bond trades that occurred that day. The verification process includes data on which security bond was bought and sold, the price and the accrued interest.

Internal Communications

The system also provides an internal communications network to send messages to an individual or to every trader on the floor. This network is important since noise level directly affects the work done by the trader, who must listen and record many bits of information via the telephone. The messages can also be recalled if a trader missed it when it was called up.

The two systems and front ends, which include a CCI channel adapter and a multiplexer, are valued at \$600,000, according to Donnelly. Besides the Meta 4 minis and front ends, the system includes a card reader, disk drives, paper tape unit and magnetic tape.

The two Meta 4s share a Kennedy magnetic tape controller; the disk drives can be switched between the two computers. Both computers are fully redundant and are used as backup to each other, Donnelly said, adding the batch card reader system has been kept as a further backup system.

The system stores 130 data files for use by a trader at any time.

The data is copied continuously; every half hour all the data is printed so it can be stored off-site. The trading information is taken off-site daily and software is also kept off-site.

System Handles Egg-Trading Job

(Continued from Page 47)

confirmation, that lists the details of the agreement — names of buyer and seller, type and quantity of eggs, shipping route and delivery date. Finally, the system prints a bill to the buyer and a check for the seller.

A summary of each day's trading is also compiled. Applied Systems Inc., who wrote the software, arranged a telephone link with Pennwire, a commodity trader's wire service.

Data to Clearinghouse

Every 10 minutes, the clearinghouse mini dials into this link and sends a summary, and updated information becomes available to traders all over the country.

The clearinghouse system is built around a Digital Equipment Corp. PDP-8/A minicomputer running under Educump's Eto's time-sharing operating system. The installation has 32K of core memory and uses two RK0-5 disk drives. A Decwriter and four Decscopes complete the equipment.

Delano felt the move to the system was inevitable. "I knew we couldn't continue to expand," he said.

"When there are many price adjustments to bids and offers being made, it's hard to keep track of which two come together first. We would probably have to start taking a trading recess to work through the information without the computer."

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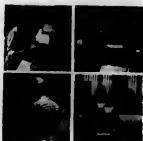
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Cross-Indexing Up-to-Date

Mini, Microfilm Simplify Court File System

LAS VEGAS — Filing the thousands of civil and criminal cases that enter a court information system is one thing; but interfiling and cross-indexing to the original document and the thousands of addending papers is quite another.

At the Clark County Courthouse, an ICL, Inc. 1543 (formerly Singer Business Machines' System 10) with two tape drives, three disk drives and one printer — in conjunction with an Eastman Kodak KOM 80 computer output microfilmer and Miracode microfilm retrieval units — has assisted in providing an answer, according to Don Richards, microfilm systems manager.

New case documents and supplement

tal papers are microfilmed immediately after filing. The processed microfilm is used to provide an updated master file of case papers, an archival file and a keying or data entry medium for creation of an expanded case history index. Key entry is performed on ICL 1501 intelligent terminals or 4301 key-tape units.

The case number as well as all plaintiff and defendant names and other pertinent information associated with the case, is provided to the 1543 system.

Direct access to this file is provided by the intelligent terminals. This allows entry of court dates for trials and hearings as well as direct access to the

same information for checking case load and providing court timing control, Richards noted.

Tape from the mini containing the information from this same data base is updated to quarterly segments on microfilm. The microfilm is directly accessible by name key to any record of the data base. This method provides for continual clearing of history from the system and continual creation of an archival expanded index to the cases on microfilm.

By the use of both minicomputer and microfilm disciplines, the office provided a total system that is for all practical purposes infinitely expandable as well as directly accessible, he

contended. As many as 90,000 records can be recorded for storage in a single microfilm magazine. This equates to an approximate average of 30,000 civil or 45,000 criminal expanded case indexes 120-byte logical records.

The system reportedly allowed the elimination of the last of the costly handwritten red leather bound volumes found in American court clerk offices since the beginning. This last surviving vestige of the old days is the judgment docket. The record of judgment is now entered via the 1502 terminal and used to clear, by date, active cases and to record the judgment. The resulting time savings was six man-hours per day, according to Richards.

The mini is also used to process information regarding fees collected. All transactions are recorded on Singer 925 transaction recorder magnetic tape cassettes to collect the required information including the case number. These tapes are read into the mini to create an output tape for use by the court as well as the county DP center for fiscal control, he explained.

Various case statistics are generated from the data. An additional file created on the mini is the marriage license application file. This includes all applications issued in Clark County, Nevada. Applications are keyed on key-to-tape units, processed on the mini and output to the KOM 80. The resulting microfilm record is taken to Kodak Miracode retrieval units for 10-second location of any license by either person's last name.

The Clark County Courthouse purchased the Singer system because service was very important, and Singer had service depots to take care of established customers here, Richards noted. When Singer went out of business "it was wild for a while," but now that ICL has taken over, service has improved again, he said.

Interdata Minis Get Controller

ANAHEIM, Calif. — Western Peripherals, Inc. has another single-board magnetic tape controller for Interdata minicomputers.

The TC-140 features total software compatibility with existing Interdata operating systems, the company claimed.

The TC-140 is a plug-in, single-board, dual-density controller with all interface and formatting electronics for both PE and NRZ, the firm said.

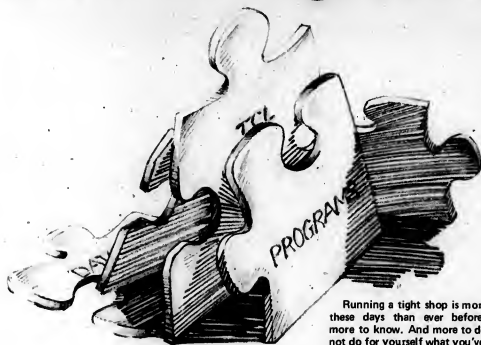
Up to four drives can be handled by the unit in any combination of seven-track NRZ, nine-track NRZ, nine-track PE, or nine-track PE/NRZ at any two speeds in the range of 12.5- to 125 in./sec.

The unit also features an extended command register and an enhanced status register.

Available as a complete subsystem (designated TS-140) or as a separate controller, it is provided with tape drives, repeatedly fully integrated and tested as a system using an Interdata computer.

The TS-140 costs \$3,100 from the company at 1100 Claudina Place, Anaheim, Calif. 92805.

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DEC Has Lab Peripheral Controller for PDP-11

MAYNARD, Mass. — Development of what Digital Equipment Corp. claims is "the fastest commercially available microprocessor-based laboratory peripheral controller" designed for the firm's PDP-11 minis has been announced by that firm.

The LPA11-K controller uses Fortran calls and is said to transfer analog data at an aggregate rate of up to 150,000 sample/sec.

80% Reduction

The transfer rates are achieved by the controller's use of direct memory access, which results in a 60% to 80% reduction in CPU overhead rates as compared with previous techniques, the firm said.

Expansion Memory Made To Fit DG Nova Minis

ENGLEWOOD, Colo. — A non-volatile add-in expansion memory designed to fit Data General Corp. Nova minicomputers is offered by Monolithic Systems Corp.

Adaptable to the Nova 800, 820, 830, 81200, 1210 and 1220 systems, the MSC 3401 memory is expandable in 4K increments to 32K words. It is "totally" hardware and software compatible with the mini, the vendor claimed.

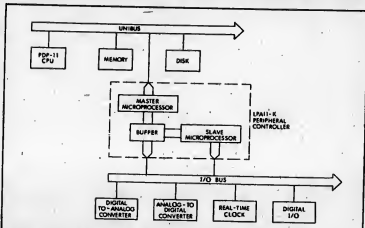
Featuring an access time of 240 nsec

company said.

Operating under the RSX-11M operating system on all PDP-11 minis with Unibus I/O, the unit features two modes of operation. In single-user mode, higher speeds are achieved while in multiuser mode up to eight users can control experiments or processes simultaneously, a spokesman said.

The system incorporates two microprocessors to control data and command transfers between laboratory-oriented peripherals and the PDP-11 CPU.

The LPA11-K costs \$4,985 from the firm in Maynard, Mass. 01754.



Schematic shows function of DEC's LPA11-K interface/controller. It links the standard PDP-11 Unibus to a separate instrument interface I/O bus through the use of microcomputer technology.

Tri-Data Disk System Bows

MOUNTAIN VIEW, Calif. — Tri-Data Corp. has introduced the Flexifile 21, a microprocessor-controlled flexible mini disk system.

The Flexifile 21 is designed for DP and communications applications including program loading, data logging and on-line data collection.

The system is user-programmable and controlled via its front panel. Eight indicator lamps and six mode select switches are featured and a standard Text Edit software package is included with the unit. A file management system will be optionally offered, the firm said.

Equipped with the RS-232 and/or current loop interface, the Flexifile 21 can accommodate a terminal and modem simultaneously at independent transmission rates. The user can prepare his data off-line and then batch process it to a CPU at a high transfer rate, reducing costly line time, the firm continued.

The Flexifile 21 is available as a desk-

top unit or in a rack-mounted configuration. Utilizing a Shugart mini-floppy drive, the unit also contains an Intel 8080 microprocessor, built-in controller, electronics and power supply and costs \$1,995. Tri-data is at 800 Maude Ave., Mountain View, Calif. 94043.

Vendor Refurbishes Tape

SHELTON, Conn. — Magnetic Information Systems has announced a refurbishing policy for magnetic cassettes unfit for use because of damage, wear or other reasons.

After purchasing cassettes from Magnetic Information Systems, a user can send a used cassette to the vendor for rework, a spokesman said.

For \$2.50 each for a minimum quantity of 25 pieces, the vendor will replace the magnetic tape, change pressure pads if necessary and recertify and repack the cassette, the company said from 415 Howe Ave., Shelton, Conn. 06484.

Mass Storage Device Suits Syfa System Data Bases

IRVINE, Calif. — A 300M-byte mass storage device designed to meet the large-scale data base requirements of the vendor's Syfa systems has been announced by Computer Automation, Inc.

Designated the DSK-300, the device offers 220M bytes of user-accessible storage and employs Control Data Corp. 9883-91 removable disk packs. Up to eight DSK-300 devices can be linked to a Syfa system, extending total user-accessible storage to 1,760 M bytes.

Larger Capacity Files

The company also said it will make available a new version of its Syfa Concurrent Logic Operating System (Syclops) to permit the storage of larger-capacity individual files. Previously, the largest file allowed by Syclops with currently offered 10M-byte and 80M-byte capacity disk drives was 32,000 sectors or 8M bytes.

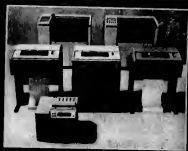
The recently announced Syclops provides for individual file capacities up to 900,000 sectors of 230M bytes. The larger file capacities are applicable to the new 300M-byte drives as well as the existing 80M-byte drives, the firm said.

Compatible With Syfa

The DSK-300 is compatible in format and hardware with all existing Syfa systems, according to a spokesman, and no software changes are required if users wish to upgrade their present configurations from existing 10M-byte and 80M-byte mass storage devices. Computer Automation, how-

ever, will continue to offer and support both smaller disk drives to Syfa customers, the firm added.

The DSK-300 is contained in a stand-alone cabinet. Price is \$32,500 with 120-day delivery. Computer Automation is at 18651 Von Karman, Irvine, Calif. 92713.



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Now you've got to admit biting on an offer like this is a lot better than biting the bullet. Just call the number below or write us on your letterhead. A salesman will bring you information on our Mix and Match Plan along with an Executive Decision-Making Kit, complete with operating instructions and a real bullet.

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Are You Covered?

By Frank Vaughan

CW Staff

Fire... Flood... Wind...

No one likes to think about disasters, but the hobbyist with privately owned computing equipment in his home should be asking some serious questions about the insurability of that equipment.

Under most homeowner policies, microcomputers are covered as contents, according to Ted Kwash, a superintendent in the Personal Insurance Department of Aetna Life and Casualty Insurance Co. in Hartford, Conn. However, Kwash noted in a recent interview, that is similar to the one in which I found myself at that time.

Faced With Three Options

User Picks Micro System Based on Z-80

William L. Colsher

Special to CW

There are a large number of different brands of personal computers available today, and the number is growing every month. The process of choosing a system from this vast array can be a difficult one.

When I first decided to buy a computer system for personal use, there were only a few choices open. This has changed somewhat recently, but the choices which existed then still affect people in a position similar to the one in which I found myself at that time.

Since, like most people, my budget was rather limited, I certainly couldn't buy a commercial system. Even the less expensive minicomputer was far beyond my price range.

I briefly considered buying a used Digital Equipment Corp. PDP-8, but the price of DEC's memory and peripherals eliminated

Insurance is not just limited to homeowners, he noted. Persons who own condominiums or who rent their residences, can generally buy "contents coverage" which will include their computers.

Kwash urged all home computer owners to check with their insurance agent or company to find out exactly what coverage they have.

Even if the hobbyist finds his home system is covered, the next concern should be what disasters the insurance covers. Most policies have "specified perils" which cover the hobby system either in or away from the home.

There is an "all risk" category in homeowner policies, but fewer than 2%

of all policies have this coverage. Kwash pointed out.

A third concern should be how the system is to be valued in the event of a loss. Generally the insurance adjuster has a range within which he can work to determine the value. One method is to compare the product to a comparable commercial product's wholesale cost.

In the event of a hit, coverage is generally limited to twice the cost of the material.

Microcomputers, like all personal property, depreciate in value. Kwash warned: Policies pay on the "actual cash value" of the system; this means that if a three-year-old system is destroyed, the reim-

(Continued on Page 57)

that choice rather quickly.

The advertisements in magazines like *Popular Electronics* and *Byte* gave me what seemed to be three alternatives. The most common type of system was based on the bus structure of the first of the widely available personal computer systems, the MITS Altair 8800. The advertisements and magazine articles made them look pretty good, so I sent away for the catalogs.

The second major choice was a Southwest Technical Products Corp. (SWTPC) 6800-based system. This system was considerably cheaper and seemed to give a lot more for a lower price, so I sent for that information packet as well.

The final choice was a system based on the then-new Z80 microprocessor chip. The system was somewhat cheaper than a comparable Altair-type system, but a lot more expensive than the SWTPC 6800. Digital Group, the company that made the system,

didn't supply a cabinet or power supply at the time, but neither of those items are particularly expensive or difficult to make.

When all the information came, I began to compare the systems. The major drawback of the Altair-type systems was that only a tiny amount of memory (256 bytes) was supplied and the front panel was a very costly and unnecessary frill.

Magazine articles are still being published that give instructions on improving the inadequate power supply that came with that type of system (Kilobaud, August 1977). One Altair-type system came with a super power supply (the Imsai 8080), but it was much too expensive.

In addition, the bus structure was designed for the 8080 processor and it would have been extremely difficult to efficiently interface more advanced chips. For example, a recent 16-bit processor requires two circuit boards for the interface circuitry.

The SWTPC 6800 system was very inexpensive and also supplied 2K of memory and an I/O interface for only \$395. This company also had a fairly good reputation for other kits and super prices on software—for example, \$14.95 for Basic compared with \$150 from MITS.

Just in Time

The Digital Group system information came last, just about the time I was going to send my money to SWTPC. The front panel was nicely bare and all the I/O could possibly use was supplied—all four parallel input ports and four output ports, a TV monitor display interface and a cassette tape interface.

Best of all was the fact that 2K of memory was supplied and an additional 8K was only \$200; a total of \$675 plus a little more for a

(Continued on Page 57)

Workshop Set for This Week On Interfacing, Programming

BLACKSBURG, Va. — A three-day workshop that will present the basic techniques of microcomputer interfacing and programming will take place at the Donaldson Brown Center for Continuing Education here beginning Dec. 8.

The course will cover the basics of a microprocessing unit (MPU), an introduction to microcomputer programming, I/O functions, chip compatibility, subroutines and interrupts and register transfer devices.

Because the workshop is a hands-on laboratory course, participants will have access to a breadboarding microcomputer station that is based upon the 8080A and 8085 chips and associated support chips such as the 8255 programmable peripheral interface chip, the 8251 universal receiver/transmitter chip and the 8212 8-bit I/O port chip, according to a spokesman.

A variety of complex programmable chips will also be discussed to provide an awareness of future trends. Among them will be the 8253 programmable interval timer, the 8259 interrupt controller and the 8257 CRT controller.

The course was designed for those individuals who are just starting to interface microcomputer hardware. Programming in the workshop will be performed using machine code so each individual can write the I/O driver routines necessary to operate

the hardware.

A two-day digital electronics workshop will precede the conference on Dec. 6-7 for those individuals with little or no digital electronics experience, the spokesman noted.

The registration fee for the microcomputer interfacing course is \$195. The digital electronics workshop costs \$145.

Additional information about both courses can be obtained from the Donaldson Brown Center for Continuing Education at the Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

Heurikon Board Fits Intel SBC

MADISON, Wis. — A microcomputer board that is bus-compatible with Intel Corp.'s single-board computers (SBC) and has a multiprocessor capability was announced by Heurikon Corp.

The MLZ-80 features 4K of random-access memory (RAM) and up to 8K of read-only memory (ROM). It also has an on-card floppy disk interface for standard or mini-floppy drives, a spokesman said.

The unit has dual serial asynchronous/synchronous ports with separate software-controllable transmission rates from 50 bit/sec to 19.2 kbit/sec; RS-232C or current-loop interfaces; four 8-bit parallel ports (two

of which have bidirectional capability); direct memory access logic for I/O and memory data transfers or searches; four counter/timers; a selectable power-on jump logic starting address; and full 2-80 vectored interrupt support, the firm claimed.

In its maximum configuration, only three power supplies are required: +5V, +12V and -12V, the spokesman noted.

Pricing of the boards begins at \$350 and depends upon configuration and options. System development, including hardware interfaces and application software, is also available from Heurikon at 700 W. Badger Road, Madison, Wis. 53713.

MICROCOMPUTING

C CABLE, TWISTED-PAIR — A cable formed by twisting together two thin conductors which are each separately insulated. This arrangement can reduce their interference.

CAGES, CARD FRAME — The basic cage recesses the card frame and is equipped with wings for 19-in. rack mounting. The system cage adds a hinged front door panel for mounting controls and indicators. Some instrument cages are designed with extended depth to accommodate a middle component chassis allowing special components to be mounted within the standard chassis.

CAPACITOR STORAGE — 1. A device which stores a digital bit or an analog voltage by charging a capacitor. 2. A storage device that utilizes the capacitance properties of materials to store data.

CARD — 1. A machine-processable information storage medium of special quality paper stock, generally 7-3/8 by 3-1/4 inches, but other standards exist for other types. 2. An internal pluggable unit for printed circuits wiring and components.

CARD CODE — Refers to an arbitrary code in which punched holes have assigned numeric or alphabetic values.

CARD COLUMN — 1. A line of punch positions parallel to

the Y datum line of a punch card. 2. A single line of punch positions parallel to the short edge of a 3-1/4- by 7-3/8-in. punched card.

CARD GUIDES AND EDGE CONNECTORS — Some companies offer steel cadmium-plated card guides with ABS plastic insulated and properly sized for microcomputer modules. They are typically provided with standard slot spacing of 1 inch (25.40 mm). Optional spacing of 1/2 inch (12.70 mm) and 3/4 inch (19.05 mm) are available on special order. A 22/24 (pair/contacts) edge type connector with gold contacts and necessary polarizing keys are generally provided with mounting brackets and screws.

CATASTROPHIC FAILURE — A failure which is total or nearly so, such as breakdown of the power supply, making all circuits inoperative. Any type of failure which renders the useful performance of the computer to zero.

CATHODE RAY TUBE — 1. A tube which has an electron beam which can be focused to a small cross-section on a luminescent screen and can be varied in position and intensity to produce a visible pattern. Abbreviated CRT. 2. An electronic vacuum tube containing a screen on which information may be stored by means of a multigrid modulated beam of electrons from the thermionic emitter storage effected by means of charged or uncharged spots. 3. A storage tube. 4. An oscilloscope tube. 5. A picture tube.

LEARNER'S LEXICON

From Microcomputer Dictionary & Guide by C. J. Sippi and D. A. Kidd. Used with permission of Matrix Publishers, Inc. 207 Kenyon Road, Champagne, Ill. 61820.



COMPUTERWORLD

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This special classified section in solid (non-display) format is designed for people who are working with or interested in microcomputing. Through it, you can buy, sell or swap equipment, software or services; contact people with similar interests; start clubs; disseminate information; look for game partners; or send messages to other individuals. As the number of ads increases, this section becomes more useful; so we've tried to make ad placement as simple and inexpensive as possible. Details are as follows:

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User Goes With Z-80 Micro

(Continued from Page 55)
power supply would put me in business.

It took about two months to get all the boards in. Because I was a rank beginner at kit building and a friend was doing most of the actual soldering and such, however, spreading out the project helped keep things under control.

Compared with a Heathkit, the instructions were incredibly poor, but since the construction consisted only of soldering sockets into printed circuit boards along with a few discrete components, the detail of Heath-type instructions really wasn't needed.

The components were all of excellent quality and in the one case where a part was missing, a phone call to Digital Group had the part in my mailbox in less than a week. One exceptional feature of the system was the fact that sockets were supplied for every integrated circuit, even ones where the socket cost more than the components.

Other systems, such as the SWTPC 8000 require that you either buy your own sockets or solder ICs directly to the boards.

In all cases, the boards checked out the first time with not a single faulty component.

The Digital Group tape system is a considerable improvement over the other common systems for a number of reasons; it is one of the best features of the system.

One of its major technical improvements is that the two frequently problems to record data are not harmonics

of each other. This tends to increase the reliability of the system.

The most important difference for the user is that the system runs about four times as fast as the other most common tape system. The Digital Group system records and plays at about 1,000 bits/sec or about 125 bytes/sec. The Tardell/KC standard type of interface, on the other hand, operates at only about 30 byte/sec.

The Digital system is also quite reliable. All the problems I have had could be traced to inferior tapes or bad adjustment of the interface itself. This adjustment is rather critical and for this reason Digital Group recently brought out a new design that does not require any adjustment.

At the time I bought my system, none of the companies had very good software. Digital Group has, however, recently taken a commanding lead. It now has a digital cassette operating system that is quite complete.

A very complete Business Basic is available which was written by Microworks of Cincinnati, the computer store where I bought my system. Digital is also supplying a new type of programming language called Converse, a threaded language.

Would I buy the same system today? Maybe. It remains the most powerful system on the market, with the possible exception of the Heathkit LSI-11, in my opinion.

Cohler is a full-time writer and part-time microcomputing consultant in Hoffman Estates, Ill. The opinions in this article are his own.

Monolithic Board Works With Intel SBC-80

ENGLEWOOD, Colo. — A single-board computer with 8K bytes of static random-access memory (RAM) and 8K bytes of erasable programmable read-only memory (EPROM) that is said to be compatible with the Intel Corp. SBC-80 Multibus system was announced by Monolithic Systems Corp.

The MSC 8001 was designed around the Z-80 microprocessor unit (MPU) with up to 4 MHz clock speed, the firm said. Using the Z-80, this unit provides 158 instructions which include the 78 instructions of the 8080A MPU and provide indexed, bit and relative addressing modes.

Protective Ports

Two parallel I/O ports consisting of peripheral interface circuits with buffers and terminators protect all of the internal metallic oxide circuitry, a spokesman claimed.

A total of 48 lines are available and can be configured for either positive or negative true logic signals, he added.

Real-time processing is provided

with an interval timer that contains three 16-bit counters which operate independently. One is reportedly dedicated to the serial I/O port and the other two are available for general use.

Interrupts Provided

The MSC 8001 provides eight levels of fully vectored priority interrupts; there are also other interrupt modes for SBC-80/10 compatibility, the vendor noted.

Memory is available with either 4K or 8K of standard 18-pin, 4K by 1K static RAM. The EPROM and RAM address structure, defined by programmable read-only memory, eliminates the need for jumpers and switches, Monolithic said.

The MSC 8001 supports serial I/O devices with programmable communications rates that are compatible with RS-232C, TTL or current-loop interfaces, according to a spokesman for the firm.

With all interface elements, the MSC 8001 is priced at \$845. Monolithic is at 14 Inverness Drive East, Englewood, Colo. 80110.

Most Home Micros Covered

(Continued from Page 55)

bursement, less the deductible, will probably not pay for the replacement of an identical system.

There is, however, an option for the hobbyist who wishes to provide better coverage for his system. A hobby system can be placed on a "schedule," according to Kwah.

Placing a micro on a schedule will generally help the hobbyist because the value of the system is predetermined and agreed upon by both parties. Generally the insurance company calls for a third-party estimate of the value, Kwah said.

This gives the hobbyist the best

chance to recover the maximum amount should a loss occur. With some exceptions, placing the micro on a schedule provides an added benefit because items which are insured in this manner are covered for all losses with no deductible.

Placing software on such a schedule is probably the best way to insure it, Kwah indicated. Otherwise, it may be difficult to prove its value over and above the cost of the cassette, paper tape or diskette.

As a final point, Kwah noted that a micro would probably be excluded from coverage if it was the cause of the loss.

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Microsoft ("Altair") BASIC for 8080/286/802 and FORTRAN IV for 8080/286 now available to OEMs, and users. 8080/286 BASIC has random, sequential files; double precision; IF...THEN...ELSE and more. FORTRAN produces optimizable code; meets ANSI-95 except complex; C/P/M and ISIS-B BASIC or FORTRAN, off the shelf or custom versions. Microsoft, 300 San Mateo NE, Suite 610, Albuquerque, NM 87108 (505) 262-1486.

WANTED SYSTEMS AND APPLICATION SOFTWARE for 8080 MPU business inventory. Name and address Text Editor Gamas Master Software, Wood Dale, IL 60191 (312) 788-1412.

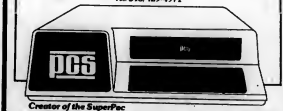
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Cassette Operating System Offered

NEWTON, Mass. — A cassette operating system that will run on most 8080 and Z-80 microprocessor units and is distributed on Tarbell, Digital Group and TDI standard tapes was announced by Algorithmics, Inc.

The Zaps system consists of a full Z-80 assembler, text editor, in-memory file system, labeled cassette tape storage system with full cyclic redundancy checks on all tape operations and a variety of other software

utilities, the firm said. It is resident in 14K of memory, which includes all buffers and 1K byte of symbol table space.

No line numbers are required on the text editor as only the actual data bytes are stored. Editor commands include input, insert, delete, replace, change, global change, up, down, top, bottom, string search, print and print current line number, a spokesman claimed. The assembler processes the Zilog

recommended form of mnemonics. A variety of pseudo operands is available including origin, end, define byte, define word, define string and equate. The Zaps system also features English error messages and the ability to accept numerical values in hex, octal, decimal or binary form, it was reported.

The system, including a 90-page users manual and examples of how to modify the system for a variety of microprocessor I/O devices, is priced at \$60 from Algorithmics, Inc., Box 56, Newton Upper Falls, Mass. 02164.

RAM Unit Nonvolatile

LA FAYETTE, Ind. — Micro-processor memory expansion with nonvolatile memory is reportedly possible with a module introduced by the Wintek Corp.

The Wince CMOS random-access memory (RAM) battery module utilizes two size AA nickel cadmium batteries to retain memory during power off conditions, even when the module is unplugged from the system bus, the firm said. The batteries reportedly last up to one year.

The module can accommodate up to 2K bytes in multiples of 256 and has write protection. The unit is available on standard 4-1/2 in. by 6-1/2 in. 44-pin printed circuit boards for \$399 from the Wintek Corp., 902 N. 9th St., Lafayette, Ind. 47904.

Intel Adds RAM Boards

SANTA CLARA, Calif. — Intel Corp. has extended the amount of memory available for its 58C 60 line of single-board computers in announcing three random-access memory (RAM) expansion boards.

The boards store 32K, 48K and 64K bytes of data and are respectively called the 58C 032, 048 and 064.

Each board stores data in 16K-byte blocks, using individual Intel RAMs, in contrast to previously available boards that stored 16K bytes each.

Storage dedicated to one CPU or shared by several is accommodated by the directly interfaced system bus structure, Multibus, containing read

and write buffers.

Block addressing is jumper-selectable with the intent of optimizing use of computer-resident and expansion memory capacities.

The boards are marketed at single-unit prices of \$1,650 for the 58C 032, \$2,300 for the 58C 048 and \$2,950 for the 58C 064, with OEM discounts for quantities of 10 or more units.

Intel Corp. is located at 3065 Bowers Ave., Santa Clara, Calif. 95051.

IOR Introduces Video Unit

DALLAS — A video system containing all the address decoding necessary for both memory-mapped and isolated I/O on a 5-in. by 10-in. printed circuit board was announced by IOR.

Video output of the board is either XYZ-transistor-transistor-logic compatible or composite video. The display consists of 1,920 characters organized as 30 lines of 64 characters plus a 128-char. non-playable buffer, the firm said.

With each I/O instruction, the cursor is reportedly automatically updated, thus eliminating the necessity of cursor movement in the program, a spokesman claimed. There is 2K bytes of memory on board with under 500

nsec of read/write time, he added. A screen of data can be completely changed in under 800 microsec.

Price of the VSD2K kit is \$399 from IOR, Box 28823, Dallas, Texas 75228.



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- Be able to self-determined about its programming guided only by the necessity-value of the solutions which it itself would determine.
- Self-sustaining and self-protecting against present and future damage and able to estimate future damage.
- Able to perceive and record all sensory perceptions including color, smell, taste, audio, odor, tactile etc.
- Absolutely no down-time.
- The entire machine would be portable.

It may seem impossible but this machine is already in existence! About 3 billion of them actually. In fact you have one. For you are dealing with the human mind.

That is the brain you have, potentially. If it does not do these things, it is slightly out of adjustment.

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Micro Drives Get Controller

LOS ANGELES — Wangco, Inc. is offering a micro-controller for use with 5-1/4-in. diskette drives in 6080- and 8080-based microcomputers, minicomputers and other byte-oriented systems.

The 8201 micro-controller is pin-compatible with the standard 5-100 bus. A single printed wire board reportedly plugs directly into the 5-100 connector. A principal component of the unit is an Intel MCS 8048 microprocessor, which facilitates a nine-macro-command structure and provides 1K byte of read-only memory (ROM).

Formatting performed by the 8201 is reportedly of a soft-sectored, modified IBM type with 16 sector/track and 128 byte/sector. The unit provides for a 128-byte sector buffer or multiple sector transfer without buffering, a spokesman said.

Features of the 8201 include a diagnostic command for self-test operations and a duplicate function

which automatically copies diskette information from one drive to another at one command from the host, the firm added.

The unit, which will control up to four drives, sells for \$490 from Wangco, Inc., 5404 Jandy Place, Los Angeles, Calif. 90066.

Pro-Log Offers 1977/78 Catalog

MONTEREY, Calif. — Pro-Log Corp. has published its 1977/78 price list and catalog illustrated with product photographs and selection charts.

The 48-page publication is a guide to the firm's line of programmable read-only memory (Prom) programmers, microprocessor systems, analyzers, support hardware and design courses and seminars. The catalog also introduces new Pro-Log products and lists some price reductions.

Sections on 8-bit and 4-bit microprocessor systems include data on 8080A, 8085, 6800, Z-80, 8008, 4004 and 4040 products including starter sets, testers and support hardware.

The catalog is available free from the Pro-Log Corp., 2411 Garden Road, Monterey, Calif. 93940.

Plastic Enclosures For Computer Builder

BRIDGEWATER, N.J. — Three high-impact plastic enclosures designed for the computer builder were introduced by Enclosure Dynamics, Inc.

The VTE 101 terminal enclosure, KBE 101 keyboard enclosure and TVT 101 typewriter enclosure are flame-retardant and easily machinable using ordinary woodworking tools, the firm claimed. They reportedly feature molded ventilation grills, a removable keyboard plate, and ribs and bosses for component mounting.

The terminal enclosure is priced at \$69.95 unpainted and \$79.95 painted; the keyboard at \$19.95 and \$25.95; and the typewriter at \$39.95 and \$48.95 from Enclosure Dynamics, Inc., P.O. Box 6276, Bridgewater, N.J. 08807.

Power Supplies Bow

NEWTON, Mass. — A series of AC/DC power supplies that deliver +12 or +15 VDC at 50, 100, 200 or 300 mA has been introduced by Intronic, Inc.

The eight Series EPM units reportedly feature stable references, low-phase shift and broadband regulator circuits to achieve low drift and offset. The standard output tolerance is about 2%, the firm said. The units are stable even with

large values of capacitance across their outputs and they permit buffering against severe load transients, it said. All thermal factors are controlled and low thermal masses and thermal gradients allow for a minimum delay in reaching equilibrium, a spokesman said.

The series costs from \$29 for 60mA models to \$65 for 300 mA units. Intronic said from 57 Chapel St., Newton, Mass. 02158.

Unit Compatible With SBC 80

ENGLEWOOD, Colo. — Monolithic Systems Corp. has brought out the MSC 8001 single-board computer, which reportedly is compatible with the Intel SBC 80 single-board computer and built around the Zilog Z-80 microprocessor.

The MSC 8001 features 8K words of random-access memory (RAM) and 8K words of erasable programmable read-only memory (Eprom) with serial and parallel I/O ports.

The Z-80 processor is used to provide 158 instructions, including 78 instructions of the MSC 8080A computer, and to provide indexed, bit and relative addressing modes.

Real-time processing is accomplished by the 8253 interval timer, which contains three independently operating 16-bit counters. Eight levels of fully vectored priority interrupts are featured, according to the firm.

The MSC 8001 single-board computer is priced at \$645 including all interface elements and 8K words of RAM from Monolithic at 14 Inverness Drive East, Englewood, Colo. 80110.

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On Small Business Scene Vendors Seldom Alone at Client Site

By Molly Upton
CW Staff

Small business system vendors usually meet three or four other competitors at a prospective user's site, according to a CW survey of those vendors.

Very seldom does the user call only one vendor, they acknowledged, and the number of vendors under consideration can go as high as 10, although generally the user narrows the field to three or four serious contenders, they said.

Geography in large part can determine who competes, several indicated.

And mainframers with small system offerings face the same competitive situations as

do the small system vendors except when the user already has some of that vendor's gear, according to the survey.

Few said they see much competition from the systems houses, firms that buy hardware on an OEM basis and provide software.

When the user has been referred by a friend or business acquaintance, the vendor is apt to have the stage all to himself, respondents indicated.

But even then, the user is likely to have done some sort of price analysis, according to Art Carofalo, vice-president of sales at Minicomputer Systems, Inc.

One reason there are not more vendors generally involved is that the small

businessman doing the purchasing cannot afford the time to look at too many, according to Carl Jeremias, vice-president of marketing at Basic/Four Corp.

The user probably looks initially at several more and then narrows the field to the three vendors he calls in, he continued.

Geography Significant

Nearly all respondents mentioned the significance of geography when discussing the type of competition they see in the field.

Both Terry Marsh, vice-president of sales for Qantel Corp., and Doug Russo, Univac's director of marketing support for business systems marketing (the BC-7), said the small systems vendors are apt to be more prolific in the major metropolitan areas than in the less densely populated areas. Jack Shevillo, director of general products and systems for Burroughs Corp., concurred.

Marsh explained that it takes several years for the smaller firms to field the network and support staff necessary to cover all areas. But in large cities where users have the choice between the smaller, "technological" companies and the mainframers, the mainframers are either not considered or are eliminated quickly, Marsh said.

Shevillo added that Burroughs is apt to see mostly other mainframers in the more remote areas.

The number of competitors depends "on the industry and the locality," Jeremias commented. If a firm's base is small and the salesman is working from a cold lead, then the vendor is likely to encounter at least two or three others, he said.

Basic/Four has a large number of installations in the Los Angeles area, so the number of referrals it gets is extremely high, Jeremias said. In referrals, Basic/Four is often the only system considered, he added.

Basic/Four also tends to be the only firm called by users in particular vertical industries, such as country club management, where the firm has established a reputation, he said.

Although the respondents generally indicated the mainframe vendor is often one of multiple bidders, John Cunningham, senior vice-president of field operations for Wang Laboratories, Inc., remarked that for every situation in which Wang is a bidder, there are 10 "we don't know about."

These often involve a mainframe the company has been with before for other equipment, he said.

Marsh said Qantel is seeing Univac in the field more than it has previously.

Russo indicated that since Univac has announced its BC-7, it is frequently one of the three or four firms called by a small user.

(Continued on Page 66)

IBM Settlement in ADR Suit Aimed to Avoid 'Giant' Image

By Catherine Arnsat
CW Staff

NEW YORK — IBM may have settled out of court with a software firm that sued it on antitrust charges in 1970 in order to avoid the image of "a little company versus a giant," according to an IBM document used as evidence by the government in the U.S. vs. IBM antitrust trial.

The document, dated July 8, 1970, listed several alternatives to the Applied Data Research, Inc. (ADR) lawsuit, including the suggestion to "settle so as to avoid further hearings." The case was settled in August 1970.

Hilary Faw, IBM's assistant treasurer, wrote the document, which was recently placed in the U.S. vs. IBM trial record after a long fight by IBM to keep it and other corporate papers out of evidence on the basis of attorney-client privilege.

At the time the Faw memo was written, IBM was facing law suits from ADR, two other software houses, Control Data Corp. and the Department of Justice (DOJ). All these plaintiffs charged IBM with bundling software and services with the price of the CPU in order to exclude competition and maintain a monopoly position in the market.

Faw suggested that once the ADR suit was settled, "all future programming systems will be separately priced and made available optionally with the hardware." With this action, IBM would move "conflicts with outsiders" away from the bundling to the area of discriminatory pricing. "Such arguments will be very difficult to wage and very difficult to prove one way or the other," Faw wrote.

The disadvantage of settling, however, would be that "to the world, we would ap-

pear to be acknowledging that systems programming is in fact separable from the hardware," he said.

Another alternative listed in the document was for IBM to buy out ADR and all other software houses "with whom eventually we will be in conflict." Faw's basic objection to this plan was its "open-ended nature."

The advantage of the plan was "[it] would clearly buy us some time," Faw said. "It also offers us the flexibility of buying off the first several and selecting a later one of which to make a stand in court."

IBM could also "establish a new dividing line between the programming systems and program products" to stave off the ADR suit, Faw suggested, but saw little gain in such a move. "There is apparently no level of programming systems effort which could not be improved upon by outside specialists. I think the basic question with this option is the uncertainty of what it would buy us," he said.

As a final and unpleasant alternative, IBM could "fully price on a cost basis all programming systems not yet in the public domain including separate prices for all segments of each system." This was clearly incompatible with IBM's marketing strategy at that time, and was mentioned "merely to remind us that we were to [go to court] and lose our case, this could be forced upon us," Faw warned.

ADR acquired one of the other software firms that sued IBM, Programatics, Inc., and the two were the first of the firms suing IBM antitrust claims. ADR received \$1.4 million from IBM in the out-of-court settlement in exchange for some "limited" overseas marketing rights to its "Autoflow" software package.

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Bankrupt Key-to-Disk Maker CCI Rebounds

By Jeffrey Beeler
CWI Staff

TORONTO — Six years after declaring bankruptcy and going into government receivership, Consolidated Computer, Inc. (CCI) is finally back on its feet again and operating as a financially independent organization.

Last year, the key-to-disk equipment manufacturer earned \$20 million on revenues of \$10 million, and this year profits will total \$300,000 to \$500,000 on sales of about \$20 million, the firm's marketing vice-president, Peter Baines, predicted.

To be sure, these figures are still small by IBM or Digital Equipment Corp. standards. To CCI insiders, however, their symbolic importance is immense because they signal an

abrupt, and possibly permanent, upturn in the company's previously declining financial fortunes.

Before the turning point in fiscal 1976, the financially beleaguered firm had not enjoyed a profitable year since 1970, Baines said.

But even more important, the figures mark an end to the massive transfusions of federal and provincial capital that kept the company alive during its years of grave financial uncertainty.

Too Much Too Soon

CCI's fiscal history provides a painful object lesson in the dangers of unrestricted corporate growth. The company entered the computer business in 1969 with the introduction of one of the industry's first key-to-disk sys-

tems.

At first, the company's prospects for market survival appeared good. User response to its products proved enthusiastic, and equipment sales soon surpassed \$40 million, Baines said. But even as orders mounted, CCI entered what Baines called a "superexpansive mode" in which it opened more marketing fronts than it could support. The trend began with the establishment of marketing and field service operations in the U.S. and Canada, continued with the creation of English and German subsidiaries and culminated with a \$30 million OEM contract with International Computers Ltd. in the U.K.

At the same time, the company attempted a stock offering in the U.S.,

but business conditions proved unfavorable.

As the expenses from these diverse enterprises continued to outpace the company's revenues, CCI executives found they could no longer count on their traditional sources of equity.

To a certain extent, Baines blamed the financial woes that followed on peculiarities in the Canadian banking system. "Canadian banks are somewhat more conservative, less willing to take risks than their American counterparts," the marketing vice-president explained.

At any rate, with its financial backers increasingly unwilling to provide support, CCI finally went into receivership in the fall of 1971, only two years after its founding.

Government Help

A week later, the Canadian government reacted to save the foundering firm. First, it guaranteed a lease-financing loan from Ford Motor Credit, then took over CCI's lease base and sold it back to the company in exchange for debentures.

The Canadian and Ontario governments then granted the company a \$60 million revolving line of credit and, with the debt settled, became 60% owners of CCI stock.

By March 1972, the firm had emerged from receivership, having sold its English and German subsidiaries but with the North American customer base still intact.

Today, the Canadian and Ontario governments still own about 60% of CCI's stock, with the federal government accounting for about 48% and the provincial government accounting for the remaining 12%. As the firm's financial position strengthens, however, the two governments plan to gradually cut their ownership share to 25%, Baines said.

To prevent a recurrence of CCI's past financial difficulties, company executives have deemphasized their commitment to the OEM market and channeled most of their corporate resources into the end-user business, Baines explained. This year, OEM sales will constitute only about \$2.5 million of CCI's total revenues, with the remaining \$17.5 million going into the end-user sector, he said.

They also have instituted a policy of steady, controlled growth that contrasts sharply with the company's pre-receivership days of "boom town" expansion. During the next three fiscal years, CCI plans to boost its sales methodically to \$26 million, \$34 million and \$40 million, respectively, according to Baines.

In a further move to avoid past mistakes, company executives have narrowed their scope of business interests to include just one subject — data entry. "We want to concentrate on the thing we know best," Baines explained.

Building on this existing base, they then plan to expand gradually into related DP areas like distributed processing, he added.

CCI's entry into the distributed processing market will begin in 1978 with the introduction of the Series 2 Key-Edit system. Les Sellmeyer, company president, said in a prepared announcement earlier this year.

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Vice President of Marketing
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Diablo 1641 Printer Terminal

Diablo Printer Terminal Aimed at IBM 2741 Mart

HAYWARD, Calif. — Diablo Systems, Inc. unveiled the 1641 printer terminal aimed at the IBM 2741 market.

The unit is basically an upgraded 1620 and features switch-selectable Ebcidic/Ascll code, plotter capabilities, automatic diagnostic and test features and forms handling features, according to the firm.

The optional Hypplot software package permits plotting in increments of 1/120 in. in a horizontal direction and 1/48-in. increments in a vertical path.

Card Interfaces Floppy to LSI-11

SANTA CLARA, Calif. — Data Systems Design, Inc.'s card for interfacing the firm's DSD 210 floppy disk system to Digital Equipment Corp.'s LSI-11 eliminates the need for the DEC card, thus saving one bus slot, the firm said.

The card, DSD 210-L11A, includes hardware bootstrap, dynamic-memory refresh logic and bus termination circuitry and costs \$319 each; quantity discounts are available.

The firm is at 3130 Coronado Drive, Santa Clara, Calif. 95051.

Transport Suits 3M Cartridge

PLAINVIEW, N.Y. — A tape transport for the 3M Co.'s Model DC100A miniature data cartridge is available from North Atlantic's Qantex Division here.

The transport, which measures 3 in. by 4 in. by 4 1/8 in., with cartridge in place, is designed to permit one controller to daisy chain four minidrives, the firm said.

The drive price including head electronics but no controller is \$250 in single quantity from the Qantex Division at 200 Terminal Drive, Plainview, N.Y. 11803.

Contracts

National Sharedata Corp. has received a \$15 million, five-year facilities management contract from the Security Bank & Trust Co. of Southgate, Mich.

Aspen Systems Corp., a subsidiary of American Can Co., has been awarded a one-year, \$2 million federal management contract by the National Criminal Justice Reference Service.

MSI Data Corp. has received a \$1.6 million contract from a group of wholesale druggists, McKee, Inc., for MSI/77 solid-state, hand-held data entry terminals.

Computer Sciences Corp. has received a \$3 million contract from the U.S. Air Force to provide systems engineering services to the Armament Development Test Center at Eglin Air Force Base, Fla.

Interfaces, Digitizer Bow

SOUTHPORT, Conn. — Science Accessories Corp. is offering a digitizer system utilizing a Texas Instruments SR-52 calculator as well as a line of input interface packages for use with the TI SR-52 and SR-59 terminals.

The SAC GP-352 costs \$2,850 and consists of the firm's basic Graf/Pen Model GP-353 digitizer, a TI SR-52 and the necessary interface, cabling and plug-in connector.

As stand-alone interface packages, the firm offers interface cabling, plug-in connector, calculator modification and power supply for \$750.

The firm is at 970 Kings Highway West, Southport, Conn. 06490.

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Better Educated User Seen Factor in Distribution Push

NEW YORK — A better educated user is one of the primary factors influencing the transition from the era of data processing to the era of data management, Robert E. Weissman, president of National CSS, Inc., told financial analysts recently.

As a consequence of the new breed of DP manager, who is comfortable with computers, users are trending toward the development of distributive processing, he said.

The services industry, with its traditional customer orientation, should benefit from the trend toward data management, distributive processing and other services that rely heavily on minicomputers, he observed.

Weissman predicted the services industry "will become the largest single customer group for minis as our industry provides the vehicles by which minis are installed, programmed and operated at the user level."

Other Factors

Other factors influencing changes in addition to the better educated user are:

- A user community that "seeks results, not romance," from computers.
- The user's demand to reduce costs.
- The end of the not-invented-here syndrome.

"They are the younger managers in business and government. These users are products of the computer age. They were trained in the use of com-

puters both academically and pragmatically in their business administration, engineering and even liberal arts courses. For them, computers are a basic tool, a part of their experience," he said at the meeting held by the Association of Data Processing Services Organizations (Adapso).

"Make no mistake about it, both data management and the move toward distributive processing have found their champions in this new breed of managers," he added.

The user rebellion is producing other changes throughout the computer industry. Users are demanding most of the changes in which computer and computer systems function and "they are leading the way toward the development of distributive processing, microminis and firmware," he said.

Wilson Follows Cross As ICL Director

LONDON — ICL Ltd. has a new managing director, Christopher M. Wilson, following the resignation of Geoffrey R. Cross.

Cross, a U.S. citizen, joined ICL in 1972 and reportedly is interested in moving to a warm, dry climate in order to promote the health of his young children. He will remain a director of the firm until the end of the year.

Wilson has been the director of the firm's International Division since 1972.

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But Impact Uncertain

Datapoint Expects Arc to Open New Markets

NEWTON, Mass. — Datapoint Corp.'s attached resource computer (Arc) will probably open up new markets for the firm, according to Ed Gistaro, vice-president of marketing.

But as with any new concept, it's hard to guess where the impact will be, he added.

The Arc system permits a number of processors, including IBM mainframes, to access a common data base (See story on Page 1).

Initially, Datapoint plans to concentrate on its current user base, which is primarily the Fortune 1300, although 35% of its base is with small businesses, he added.

The whole concept is predicated on

what has been Datapoint's strong point over the years, fully compatible operating systems and file structures for various products, he added.

The compatible file structure give Datapoint its real marketing edge — the ability to go to a customer and solve a problem rather than sell a particular product, he indicated.

"We were lucky enough to have a product development group with vision," he added.

And the big payoff of the compatibility of software and peripherals probably has yet to be realized, he said.

When Datapoint was investigating designing a big machine, it came across the concept for the Arc system, Gistaro said.

However, the Arc does not obviate the firm's intention to bring out a big machine, he indicated.

It's not Datapoint's intention to get into the mainframe business per se, he added. The Arc will supplement large machines whether made by Datapoint or others, he said.

"Whatever we bring out will not be a master network controller but rather either a big file processor or an applications processor," Gistaro stated.

Currently the largest disk offered by Datapoint is 200M bytes, but Gistaro indicated there are plans for larger disks which will be supplied by its Amcomp unit.

Although Datapoint breaks down its software revenues for internal purposes, Gistaro declined to give a figure. He did say that the firm charges for software mainly for protection rather than to make money.

Datapoint bundles the price of the new operating system for the Arc in with the equipment but has separate charges when acquired by itself. He indicated that establishing prices was difficult because there was nothing against which to gauge it.

Vendors Clash For Small Users

(Continued from Page 61)

For the most part, Univac sees competition, he said, and is rarely called in, alone.

But Burrough's situation is somewhat different because it has a user base of L series accounting systems. The loyalty from this base is "very high," Shevillo said, especially since Burrough's offers those with a three-cassette system the capability to transfer their applications to the B80.

As the B80 is upward-compatible with the B800 and the B1800, he said.

Some Burrough's users call in other firms as well, but generally they look at Burrough's first, he said.

Shevillo didn't know what percentage of sales leads for the B80 comes from Burrough's users.

When dealing with nonusers, Burrough's generally sees other mainframes such as IBM, NCR and Digital Equipment Corp. in the remote areas and smaller firms where they have representation, he said.

Russo and the others indicated they rarely see systems houses. Generally the small user is looking for a bit more security, Russo commented.

CPA's Role

Several vendors mentioned the role of the certified public accountant (CPA) in assisting a user in his selection. Although there was some disagreement, generally the vendors said there are not too many first-time users who call in a CPA.

But those who have the CPA help them issue their request for quotations probably waste less time looking at vendors with unsuitable products since the CPA or consultant forces them to decide on system requirements, Garafalo suggested.

"Without a CPA, the user probably looks at more vendors because he is likely to be less structured in his thinking," he added.

Cunningham said less than 10% of the users retain consultants or CPAs and send out request for quotations. Users often don't seek a CPA's help until late in the decision-making cycle.

Marsh said although the first-time user often will bring in his accountant, and sometimes a consultant, most of the time he does the selection himself. Because a CPA may more readily recommend a system with which he is familiar, several of the small firms are courting the CPA market with packaged systems. Wang has such an offering and Qantel is developing an accounting package.

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Basic/Four systems are also marketed in more than 30 foreign countries.

Earnings Reports

PERTEC COMPUTER

Three Months Ended Sept. 30	1977	1976
Rev. End	\$ 36	\$ 18
Revenue	32,548,000	24,140,000
Earnings	1,598,000	848,000
5 Mo. Shr		
Revenue	81,208,000	48,874,000
Earnings	3,068,000	1,886,000

a-Based on pooling-of-interests basis and accounting change

PLANNING RESEARCH

Three Months Ended Sept. 30	1977	1976
Rev. End	\$ 18	\$ 17
Revenue	48,488,000	42,830,000
Earnings	1,237,000	91,066,000

a-Includes after-tax gain of \$167,000 from sale of subsidiary

PRIME COMPUTER

Three Months Ended Oct. 2	1977	1976
Rev. End	\$ 38	\$ 28
Revenue	13,672,000	8,011,000
Revenue	1,062,000	351,000
5 Mo. Shr		
Revenue	34,291,000	14,777,000
Revenue	150,000	78,000
Earnings	2,640,000	1,146,000

PROGRAMS AND ANALYSIS

Nine Months Ended Oct. 1

Shr End	8.12
Revenue	3,043,450
Earnings	118,099
3 Mo Shr	.03
Revenue	1,084,756
Earnings	29,761

ROCKWELL INTERNATIONAL

Year Ended Sept. 30

	(000s)	(000s)
Shr End	\$3.81	
Revenue	\$,856,700	
Disc Op		
Earnings	144,100	
5 Mo Shr	1.10	
Revenue	1,881,800	
Earnings	41,800	

THREE MONTHS ENDED SEPT. 30

Three Months Ended Sept. 30	
	1977
Str. Enrd.	\$ 30
Revenue	8,450,000
Earnings	870,000

QUOTIENT SYSTEMS

Three Months Ended Sept. 30

	1977	1976
Shr End	\$ 36	\$ 14
Revenue	8,788,257	5,376,683
Tax Cred	708,825	214,716
Earnings	1,268,045	343,159
9 Mo Shr	.09	.08
Revenue	24,455,350	17,488,891
Tax Cred	1,899,873	948,283
Earnings	2,882,179	1,742,281

SANBORN ASSOCIATES

Three Months Ended Sept. 30

SANDERS ASSOCIATES		
Three Months Ended Sept. 28		
	1977	1976
Shr. End	\$ 66	\$ 53
Revenue	28,965,000	33,858,000
Tax Cred.	1,489,000	413,000
Net Op. Loss		413,000
Earnings	3,208,000	1,875,000

a-Adjusted to reflect 7.5% stock dividend paid in April

STORAGE TECHNOLOGY

Three Months Ended Sept. 30

	1977	1976
Shr End	\$.87	
Revenue	40,812,000	28,222,000
Earnings	3,088,000	1,872,000
P Mo Shr	1.44	
Revenue	111,897,000	86,892,000
Earnings	7,617,000	8,258,000

\$-Adjusted for 8% stock dividend paid in 1977.

a-Adjusted for 8% stock dividend paid in May 1977

SYCOR

Three Months Ended Oct. 2

Shr End	8.32	
Revenue	19,977,000	17.83
Earnings	1,096,000	1.55
9 Mo Shr	82	
Revenue	59,839,000	50.02
Earnings	2,127,000	4.33

TELEX

Three Months Ended Sept. 30

Contracts

Tandon Magnetics Corp. signed a \$4,500,000 contract with...

T-EAR

Three Months Ended Sept. 30

Calcomp with ferrite recording heads for flexible drives.

Raytheon Service Co.

TALLY

Three Months Ended Sept. 30

equipment at Fort Benjamin Harrison, Ind.

Remote Computing Corp. contract with the County

TELECOM

Three Months Ended Sept. 30

calls for an automated investment portfolio management system.

Beehive International has designed a volume purchase

TELECOM

Three Months Ended Sept. 30

terminals, spares and accessories to the Ohio College Library Center of Columbus, Ohio.

TELECOM

Three Months Ended Sept. 30

mission Support contract with a potential value of \$225 million by the Environmental Protection Agency (EPA) to provide management and

TELECOM

Three Months Ended Sept. 30

center at Research Triangle Park in North Carolina.

Digital Equipment Corp. has signed a five-year contract with the State of Texas.

TELECOM

Three Months Ended Sept. 30

1977	1976
Revenue	\$ 31
Revenue	\$ 26
Revenue	27,884,000
Revenue	27,203,000
Revenue	1,562,000
Revenue	270,000
Revenue	2,817,000
Revenue	434,000
Revenue	70,812,000
Revenue	47,388,000
Revenue	2,893,000
Revenue	708,000
Revenue	4,375,000
Revenue	1,872,000

SYSTEMS ENGINEERING LABS

Three Months Ended Sept. 30

	1977	1976
Str End	\$ 51	\$ 26
Revenue	8,791,000	8,020,000
Tax Cred	420,000	132,000
Earnings	\$75,000	184,000

TELEX

Three Months Ended Sept. 30

TELEX	
Three Months Ended Sept. 30	
	1977
Shr End	5.28
Revenue	37,884,000
Tax Cred	1,562,000
Earnings	2,821,000
5 Mo Shr	.41
Revenue	70,012,000
Tax Cred	2,893,000
Earnings	4,375,000

TEXAS INSTRUMENTS

Three Months Ended Sept. 30

	1977	1976
	(000)	(000)
Shr End	\$1.20	\$1.10
Revenue	518,587	428,158
Earnings	29,534	24,289
\$ Mo Shr	3.70	3.50
Revenue	1,471,818	1,187,701
Earnings	84,809	85,118

VERMONT RESEARCH

Year Ended Sept. 30

	1977	1976
Rev. End	\$ 66	\$ 53
Revenue	4,507,401	3,973,800
Earnings	636,341	(28,220)

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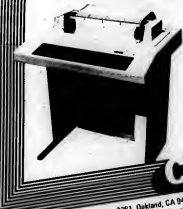
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Contracts

Tandon Magnetics Corp. has signed a \$4,500,000 contract with California Computer Products (Calcomp) to supply Calcomp with ferrite recording heads for flexible disk drives.

Raytheon Service Co. of Burlington, Mass., has been selected by the U.S. Army to maintain its IBM 360/40 equipment at Fort Benning, Harrison, Ind.

Remote Computing Corp.'s contract with the County of Los Angeles has been renewed for one year. The contract calls for an automated investment portfolio management system.

Beehive International has signed a volume purchase agreement in excess of \$4 million to supply video display terminals, spares and accessories to the Ohio College Library Center of Columbus, Ohio.

System Development Corp. (SDC) has been awarded a Mission Support contract with a potential value of \$22.3 million by the Environmental Protection Agency (EPA) to provide management and operational support for the EPA's National Computer Center at Research Triangle Park in North Carolina.

Digital Equipment Corp. has signed a five-year contract with the State of Tennessee for supply of computer systems for the state's universities and community colleges.

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Growing Annual 15% Through '85

ADL Sees World Communications Booming

WASHINGTON, D.C. — Investments in satellite and message communications systems will grow an average of 15% per year through 1985, according to Arthur D. Little, Inc. (ADL).

Speaking at a recent seminar here, the market researcher's telecommunications experts noted the demand for domestic networks based on satellite service will triple the number of earth station antennas; there were 400 in operation at the end of 1976.

Increases in traffic and terminals will quadruple the annual number of data communications messages in the U.S. from 2.3 billion in 1975 to 9.2 billion in 1985, they added.

At the same time, the basic telephone plant will retain its dominance of the telecommunications market, continue to enjoy the vast majority of investment and grow at a healthy 8% rate, ADL said.

Doubling Demand

The firm predicted the worldwide annual demand for telecommunications equipment will double by 1985, growing from \$26.2 billion in 1975 to \$58 billion. The North American market will also double in the same time period — growing from \$13 billion in 1975 to almost \$25 billion in 1985.

However, the ADL telecommunications experts believe the domestic market will shrink significantly as a percentage of the world total, from 50% to 42%. The European market will remain the second largest.

Collectively, markets for telecommunications equipment in the Middle East and other developing countries will grow at an annual rate of more than 10% to become 28% of the world market compared with 22% percent today, they projected.

The ADL team expects the total telecommunications equipment market to continue to be concentrated in switching, transmission, and local distribution equipment. In the aggregate, the markets for this equipment will climb to \$25.8 billion in 1985, they said.

The telephone growth will continue to be concentrated in countries with large-scale networks in place because these countries are far from being saturated — nearly 80% of the world's telephones are concentrated in eight countries, each having more than 10 million telephones installed, they said.

The U.S., with 149 million telephones, has three times as many as any of the other countries — Canada, Japan, the UK, Western Germany, Italy, France and the USSR. By 1980 Europe will outstrip North America in numbers of telephones installed.

Developing Countries' Edge

Both satellite and message communications systems will experience rapid growth in developing countries, according to ADL. At present, the largest number of existing earth stations is in North America, as the U.S. is the overwhelming user of data communications terminals.

Telex service has reached a state of maturity in North America, but not in developing countries, where it is an es-

sential alternative to dial-up telephones for communicating with the outside world as well as within the countries, the experts said.

One advantage which the developing countries have at this stage of technological development in telecommunications is their ability to leapfrog established technologies for those more suitable to their needs, according to John F. Magee, ADL's president.

Noting that telecommunications is actually a prerequisite for social and economic development, he observed that telephone density correlated with per capita gross domestic product has been viewed as a symptom of underdevelopment.

"The symptom has now become ingrained as a cause [of underdevelopment]," he said, adding that a new measure of a lesser developed country's capability for economic development might well be reflected by its telecommunications plans.

Technological Trends

Maximum use of electronics — currently declining in cost-per-function — to offset the rising cost of labor and copper was cited by the ADL team as one important trend in telephone plant technology. They pointed out that this may well be the only way in which the more ambitious plans of some developing countries can be achieved.

They also emphasized the use of computers to hold down the rising cost of administering telephone systems.

The growing importance of digital modulation in long distance transmission was cited by the ADL experts. They believe digital transmission will replace the more traditional use of analog over the next 10 years. The increasing sophistication of microprocessors and other circuits will cause this. They observed that substantial progress has been made in recent years in improving performance at lower cost of long distance transmission systems. Most prominent among the technologies now being developed are higher-frequency satellite systems.

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Edited by Ann Dooley, this report — titled *Supplies and Security* — will cover a wide range of supply problems, including everything from forms optimization to analysis of management utilization of DP-generated reports. Here are just a few of the areas to be covered:

- The changing supplies market — demands on the mini user
- An overview of DP media — what to look for, how to get it
- Pooling resources — how four companies share quantity discounts

We'll also look at the practical aspects of computer security in this report, with articles like these:

- Effective contingency planning — targeting danger areas
- Computer crimes and disasters — how to cut losses and minimize risk

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Regardless of your geographic preference, simply contact the
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New Jersey

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(212) 966-0100

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(503) 224-1850

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DATA PROCESSING

DIRECTOR

Boulder, Colorado

The City of Boulder is seeking a Data Processing Director with seven years' experience, which must include a 2 years in systems analysis, a 2 years in COBOL programming and 2 years in computer experience.

Degree in Computer Science or related field required. Applications and resumes must be submitted to the City of Boulder, Human Resources Department, 1000 Broadway, Suite 1000, Boulder, CO 80502. Salary range is from \$21,150 to \$28,150 (initial salary based on qualifications).

Equal Opportunity Employer
City of Boulder
P.O. Box 791
Boulder, CO 80502
Application deadline:
December 31, 1977

Telephone Company

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Professionals Required

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True Marketing Positions represent all the top level positions in most companies. This is one of those rare opportunities for a new successful salesman to enter the Corporate Headquarters Marketing environment of a major Common Carrier. Excellent location.

Required are a college degree, 5 to 10 years of demonstrable success in selling, a working knowledge of computers as used in communications, an education in marketing skills and a familiarity with Operating salesperson's compensation plan. Also desired is expertise in either Voice, Data or Networks.

For Consideration Write:

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Recruiters

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- 8. PL/1 OS Prog to B2K
- 9. MLC Systems & Prog to B2K
- 10. Numerous Consulting/Travel

If you want to step up to "STATE OF THE ART" data base systems or advance your career in 1978, call or forward your resume.

JERRY BEATTY

(214) 243-5051

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Move ahead with one of the world's most successful computer manufacturers while living in one of America's most, claimed vacation centers. San Diego offers you the climate of your choice, from the cool, mild breezes of the ocean to the consistent dry warmth of true desert—and every gradation in between. Create your special lifestyle in a hilltop hacienda, an

urban highrise, a country club condominium. Explore meadows and canyons, 75 miles of local beaches and bays, the bayside of Balboa. Continue your professional education in one of the area's many major colleges and universities, enjoy sports all year, from tennis to whale-watching. NCR—for a good living and a good life.

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■ PERFORMANCE MEASUREMENT

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Design, develop programs to support software testing, release and repair.

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Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributive processing, virtual machine, time sharing.

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Experience desired in both Tensitel and Prolog of Deposit applications plus features such as CRT Reject-Reentry.

■ COMPUTER ENGINEERING

Design and development of CPU for medium to large general-purpose computer systems. Requires BSEE with 5 to 8 years experience in logic design using very fast logic circuits. Experience in designing processor, memory or I/O control using ECL logic very desirable.

■ FIRMWARE

Design, code, maintain firmware virtual machines and/or micro utilities in firmware product development. Measure, report firmware product performance, establish performance goals, conduct product performance analysis, develop firmware performance tools. BSCS or equivalent with experience in assembly language, COBOL, micro programming, micro processors and hands-on hardware.

■ TECHNICAL SPECIALIST

Definition and specification of I/O Subsystem Configuration Accessory products. Work with hardware and software design organizations at Corporate levels to define products. EE or CS degree preferred, 8 to 10 years' experience in architecture and logic design of processors, memories, I/O controllers. Knowledge of PROM-controlled micro processor-based designs highly desirable.

■ DEVELOPMENT ENGINEERS

Perform logic design and microcoding of intelligent peripheral controllers which are PROM-controlled and micro processor-based. BSEE or CS degree, 3 to 5 years' experience in digital logic design, ROM coding and use of micro processors.

■ DIAGNOSTICS/TESTWARE

Develop peripheral test programs for fourth generation computer systems. Specify, code, debug, test and document these programs. BSEE with 3 to 4 years' experience, preferably in peripheral diagnostics.

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents, generous relocation allowance.

INTERVIEWS DURING MINI/MICRO
COMPUTER CONFERENCE, DEC. 6 & 7

To arrange a confidential interview during the 1977 Mini/micro Computer Conference Dec. 6 and 7 in Anaheim, Calif., please call George Rice at (714) 780-1811 between 9 a.m. and 5 p.m. during the conference. If you are not attending, please send your resume directly to the Professional Placement Department at the address below.

NCR DATA PROCESSING DIVISION
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PROGRAMMER/
ANALYST

A shortly to be installed Data General Eclipse S220 needs an experienced person to guide it through its formative stages and then help develop its full potential.

Heavy application experience on Online Order Entry, Bill Processing, Inventory Control, and Requirements Planning are required.

An absolute command of Basic is needed while experience with TAC Basic would be helpful. Please submit resume and salary requirements to:

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Mainline Data Processing Services Company offers opportunity to qualified Programmer/Analyst candidates with experience in applications and hardware - State of the Art Software - competitive salary and benefits plan - positions available in our Baltimore, Maryland, Chicago, Pittsburgh, Rochester and St. Louis locations. Call (312) 461-1000 or write to: Computer Task Group, Inc., 100 N. Wacker Drive, Suite 1100, Chicago, IL 60606. Equal Opportunity Employer M/F

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Need experienced Programmer/Analyst to fill opening in growing Telsys firm. Experience necessary in some of the following areas: OS, DOS, COBOL, RPGII, ALC, Payroll, General Accounting Salary Commensurate with experience. Send resume to Data Manager, P.O. Box 2014, Telus Texas 75710. Equal Opportunity Employer, M/F

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Mini-Computer Career Opportunities



A window on your future...

Sperry Univac, one of the biggest names in big computers has recently become one of the biggest names in small computers with the V-77 Family of high performance mini-computers; a fast, powerful trio that relates to most mainframes. Become part of Sperry Univac's growth to leadership in the mini-computer world! If you are a professional of proven ability and one who desires the best for your career, we invite you to consider the openings below.

See you at the Mini/Micro '77 Conference In Anaheim!

SYSTEMS SOFTWARE DEVELOPMENT

Data Communications Development

- Software design/implementation of asynchronous and synchronous protocols (BSC, SDLC, UDLG, HDLC, U100/200, 3270).
- Transaction Oriented Systems.
- Distributive Communications Architecture.
- Front-End Processor Systems.
- Assembly and Higher Level Languages.
- Project Management potential/experience.

Data Communications Pre-Sales Support & Development

- Evaluate customer data communications software RFQ/RFP's.
- Assist with software proposal preparation.
- Estimate time and cost of data communications software development effort.
- Design creative resolutions for customers data communications needs.
- Provide state-of-the-art data communications technical leadership.

Performance Measurements

- Analytic and simulation modeling.
- Establish procedures and develop necessary tools to perform the system measurements of our on-line transaction oriented system.

Software Sustaining

- Enhancement and support of operating systems.
- Telecommunications systems.
- Fortran Compiler.

Diagnostics

- Development of system level testing and fault isolation software.
- Member of hardware/software design team involved in mini-computer test systems development.
- Project responsibility for all phases of assembly language and micro-programming language implemented programs.

Special Software Design

- Real-time systems programming.
- Special interfaces/device drivers.
- Diagnostic hardware/software.
- Project control/cost estimates.
- Assembler languages.

High Level Language Development

- Pascal or Algol Programming.
- Data Base Access/Query.
- Fortran Compiler Development.
- Project Management.

Operating Systems Development

- Data Base Management System design and implementation.
- Use of DBMS in distributed environments.
- Development of simulation programs and performance measurement tools.
- On-line teleprocessing.
- Design and development of data communications software for operating systems development.
- Line and network protocols.

Custom Applications Programming

- Industrial automation.
- On-line transaction systems.
- Distributed processing networks.
- Data Base Management Systems.
- Assembly and high level language.
- Proposal writing, design specs, project management.

We offer an excellent salary and a comprehensive benefits package, as well as the opportunity to contribute to the dynamic growth of the mini-computer industry.

We'll see you at the MINI/MICRO '77 Computer Conference and Exhibition in Anaheim, California. Come and talk with our Department Managers. Please call 714/752-0377 or 833-8738 (between 8:00AM and 4:00PM) for our conference hotel location.

SPERRY  **UNIVAC**
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MINI-COMPUTER OPERATIONS
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FIELD OFFICES

Sales Engineers

We offer:

- Best commission plan in the industry.
- Competitive products to sell.
- Highly respected worldwide customer engineering support organization.
- Challenge and real growth opportunities.

Requirements:

- Minimum 2 years mini-computer sales experience in the Data Base, Data Communications and/or Distributed Processing market place.
- Technical competence in hardware and software.
- Record as a closer.
- Record of maintaining account relationships.
- Ability to obtain new and repeat business.

Field Systems Analysts

Key responsibilities in:

- Marketing headquarters interface.
- Sales/Proposal preparation.
- Defining and solving customer requirements.

Requirements:

- Technical degree desirable.
- Creative problem solver.
- Minimum 2 years pre and/or post sales support.
- Real-time commercial/Data Base, Data Communications, Distributed Processing and/or real-time scientific applications.

Sales Engineers and Field Systems Analysts positions available in: Chicago • Dallas • Houston • Detroit • Philadelphia • Boston • Rochester • Buffalo • New York (Manhattan) • New Jersey • Washington, D.C. • Atlanta • Denver • Portland, Oregon • Seattle • St. Louis • Los Angeles • San Francisco

If you are not able to attend the Conference, please call Al Seck at 714/833-2400 (COLLETS).

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software systems programmer

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Our requirements call for an individual with a minimum of 2 years operating systems programming experience on DEC-10 equipment to maintain systems software; perform diagnostics for system failures; investigate system deficiencies and recommend enhancements; design & code necessary utilities & development tools; and conduct hardware evaluation studies. Degree preferred but not essential.

Submit your resume including salary history in complete confidence to:

William P. Schultz, Manpower Planning
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Sambos
RESTAURANTS

DATA PROCESSING

MANAGEMENT CONSULTING PRACTICES

Southeastern offices of "Big B" CPA firm (Atlanta, Birmingham, Louisville, Miami, Nashville, Orlando, Tampa.)

We have opportunities for management consulting positions in our offices throughout the Southeast. Qualified candidates will have the following credentials:

- 1) BS in computer science, engineering, mathematics or business administration (MS/MBA/CPA desirable but not mandatory)
- 2) 3-7 years of diversified data processing experience including such areas as:

- systems analysis and design
- distributed processing
- data base systems
- data communications networks
- minicomputers
- computer performance evaluation
- financial information systems

- 3) Professional manner and experience. Hard working, ambitious and intelligent, with good oral and written communication skills.

Although well established, our data processing management consulting services are undergoing a period of rapid growth in the southeast. We offer exceptional opportunities for career advancement and for broadening your functional and management skills.

To confidentially explore these opportunities, send your resume and compensation history to CW Box 3352, 797 Washington St., Newton, Mass. 02460.

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PROGRAMMER

Applicant should have 3-5 years experience with scientific language and Fortran programming (also exposure to top down structure technique). Ability to work with Engineering staff in formulating programs based on engineering and systems requirements is essential. Will develop innovative aircraft monitoring systems on sophisticated real-time distributed micro computer network.

Excellent working conditions in an attractive suburban location. Considerable experience, please send resume with earnings history to: RALPH HOLTERMANN

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the prime operating contractor
to the Department of Energy at
the Idaho National Engineering Laboratory,
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FINANCIAL INFORMATION SYSTEMS MANAGER

A middle-management position responsible for 20-30 professionals involved with financial and personnel reporting systems. The successful candidate must have a proven record of accomplishment as a manager of computer professionals, specifically in financial areas. This position requires a minimum of 10 years' experience in development and implementation of computer systems with 5 years in a managerial role. A Master's degree or equivalent in Computer Science or Business Administration is required. Experience in systems analysis, COBOL programming, Data Base Management Systems and on-line applications is highly desirable.

- SYSTEMS ANALYSTS
- PROJECT LEADER
- SENIOR PROGRAMMERS

Candidates should have a college degree or equivalent, and a minimum of 4 years' experience in the development and implementation of financial and management information systems with proven capability in ANS COBOL. Experience with MARK IV and/or DBMS and knowledge of JCL for OS/IVT is desirable.

Idaho Falls is a medium-sized community located close to top flight winter sports areas (Sun Valley, Jackson Hole, Grand Teton) and unexcused summer recreation areas (Yellowstone, The Salmon and Snake Rivers, The Grand Teton).

If interested and qualified, please submit resume including salary history and requirements, in confidence, to:

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Applicant must have a degree in computer science and two to three years work experience using the COBOL language. Experience working with Data Base Systems, and some experience in programming and some experience in systems analysis. Salary range \$12,460. Send resume to Julie Ann Holtermann, University of Louisville, 103 W. Breckinridge, Louisville, KY 40202.

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PROGRAMMER ANALYST

Strong background in COBOL, a Bachelor's degree and two years programming experience including online systems are required. Knowledge of RPO, FORTRAN, and BASIC are desirable. Will participate in the design, programming, implementation, and maintenance of administrative and academic systems. Salary range from \$12,000 to \$15,000 plus relocation expenses. Send resume to Mr. Paul LeRusso, Computer Center Director, College of the Virgin Islands, St. Thomas, Virgin Islands 00801.

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 EECO, a leader in the Hotel Computer Industry has openings for a few good quality dedicated professionals. These openings are located at our corporate headquarters in Santa Ana, CA.

Sr. Cobol Programmer — A minimum of 3-5 years Cobol programming experience helpful, but not essential.
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Software Designer — A minimum of 5 years experience in the design and implementation of business logic application programs in the on-line interactive environment using minicomputers.
Programmer — A minimum of 3 years experience in the design and/or implementation of application programs, utilities, diagnostic, and maintenance programs for on-line interactive system using minicomputer Assembler Language.

Our excellent company benefits include group health insurance, liberal vacation and sick leave, pension, profit sharing and stock options, etc.

Qualified persons interested in applying for one of the above openings should forward a resume to:

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 Attn: Personnel Department

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The INFONET Division of our wholly-owned German subsidiary (CSI Deutschland, GmbH) is seeking Marketing Representatives for our office in Frankfurt.

Our continuing expansion has created immediate needs for individuals with successful sales records in timesharing (remote processing) services in the United States within the past 3-5 years. Qualified applicants must have lived in Germany, be fluent in the language and be totally familiar with German business traditions and the country's culture.

Offers of employment will be for long-term, permanent assignments and will include relocation assistance, 5 weeks annual paid vacation and an excellent German national fringe benefit package.

If you meet our qualifications, and are seeking an opportunity to return to Germany in affiliation with one of the world's leading timesharing companies, please submit a complete summary of education and work experience; family status (number and ages of children); foreign language abilities; present earnings and date of availability to:

R.M. DAVIDSON
 DIRECTOR, INTERNATIONAL PERSONNEL

We also anticipate Marketing positions becoming available in Belgium, Holland and the United Kingdom.

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EDP SYSTEMS DEVELOPMENT

Want to combine the ideal career opportunity with your favorite lifestyle? NCR Special Systems Division needs your help now in developing advanced, high-technology EDP systems for customers around the world. You'll be doing important work in our Sorrento Valley facility, just three miles from the ocean and only minutes from Torrey Pines, La Jolla and downtown San Diego. You can live in the setting of your choice—beach, valley, mountain, country, small-town or urban—and still be only a short drive from work. Spend your leisure hours golfing, swimming, hiking, getting advanced degrees up the year-round sun. Pick your climate, too—from mild coastal to dry desert. San Diego is a place of extraordinary choices—and right now the choice is yours.

COMPUTER PROGRAMMERS

The Special Systems Division has opportunities for software professionals in a broad range of disciplines and in all experience levels. Our current and firm future programs require top people with experience in any of the following areas:

- TELECOMMUNICATIONS SOFTWARE
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Notice of Public Hearing

The Executive Office of Administration and Finance, Commonwealth of Massachusetts will hold a public hearing on December 28, 1977 at 10 A.M. on the 21st floor of the John W. McCormack Building, One Ashburton Place, Boston, MA. 02108, for the purpose of reviewing rules and regulations for the procurement of data processing equipment, systems and related services. Interested persons are invited to attend and submit testimony. Written testimony is preferred and should be sent to Rules and Regulations (DPI), Room 194 State House, Boston, MA 02133.

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